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ENVIRONMENTAL PROGRESS AND ISSUES IN THE STATE OF VERMONT

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ENVIRONMENTAL PROGRESS AND ISSUES IN THE STATE OF VERMONT

MONDAY, JULY 22, 1985

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Montpelier, VT.

The committee met at 10 a.m. in the House of Representatives, Montpelier, VT, Hon. Robert T. Stafford (chairman of the committee) presiding.

OPENING STATEMENT OF HON. ROBERT T. STAFFORD, U.S. SENATOR FROM THE STATE OF VERMONT

Senator STAFFORD. The Committee on Environment and Public Works will please come to order. Vermont has long been a national leader in the effort to preserve the environment and to protect public health from the hazards of pollution. Thus, it is most appropriate for a congressional committee charged with protecting the Nation's health and environment to come to this State for pointers on controlling pollution. That's the purpose of today's hearing.

The Governor, the general assembly, and all those who have participated in the legislative process can be justifiably proud of the State's success over the last several months in enacting environmental laws. I wish we had as good a record at the Federal level, but to date we do not.

I would like to take this opportunity to report briefly on the status of the environmental agenda in Congress.

I am hopeful that before this year ends we will have three important bills signed into law, the Superfund Improvement Act, the Clean Water Act amendments, and the Safe Drinking Water Act amendments. All of these bills have been reported to the Senate by the Senate Environment and Public Works Committee which I have the privilege of chairing, and two, the Safe Drinking Water Act amendments and the Clean Water Act amendments have been passed by the Senate and are ready for conference with the House.

While the work remains to be done to get Superfund passed by the Senate, and to move all these bills through conferences with the House of Representatives, my committee is now turning its attention to two other initiatives, Clean Air Act amendments, and the Ground Water Protection Program.

Today after the Governor's overview of environmental progress and issues in Vermont, we will focus attention on air and ground water pollution, for it is in these areas that we in Congress can currently benefit the most from experience already gained in this State.

Our first panel today will contribute to the Environment and Public Works Committee's ever-growing record on the adverse effects of acid deposition and other air pollutants on lakes, forests, and visibility.

The second panel will offer insights gained from Vermont's efforts to put into place a toxic air pollutant control program in the face of very little guidance or resources from Washington.

The final panel will describe Vermont's Ground Water Protection Program and provide valuable assistance to the Committee on Environment and Public Works in Washington as we begin to debate the appropriate Federal role in protecting ground water throughout the Nation. Additional witnesses representing organizations active on environmental and health issues throughout the State will round out our inquiry.

I fully expect that today's hearings will be of great value to me personally, and to the Environment and Public Works Committee members over the coming months, and I will enjoy, once again, being able to point to Vermont as a leader among States in protecting her peoples' health and environment.

I must say that holding a hearing in this room affords this Senator considerable pleasure. It brings back memories of the happy years when I was part of State government. I'm very happy to be back in Vermont even though the weather is cooler up here than it is in Washington. I do have to say that probably the pH factor of rain falling on Vermont may be lower than that in Washington.

Having said that, we are ready for the first witness. Let me say how grateful I am to all of the witnesses who are appearing here this morning, and to Governor Kunin for interrupting her very busy day to be the leadoff witness.

Let me again say how personally grateful I am that you are able to fit this hearing into your day and how valuable your testimony will be to us in Washington when we start work on the 1985 version of amendments to the Clean Air Act with special emphasis on what should be done at the Federal level in connection with acid rain.

STATEMENT OF HON. MADELEINE M. KUNIN, GOVERNOR, STATE OF VERMONT

Governor KUNIN. Thank you, Senator. I can't tell you how pleased we are that you are holding this hearing here in the State of Vermont. When you refer to my agenda, I would put this at the top of my it any day, because, I believe that Vermont's environment and the relationship of the State's environmental initiatives and capabilities to the Federal Government are very critical. So, it's really good for us to have an opportunity to discuss current environmental problems and efforts in Vermont to comment on issues your committee is facing in Washington.

As you noted in your introductory remarks, Vermont is once again, I believe, in the forefront on environmental issues. Right in this chamber we enacted some very forward looking legislation that I believe will help indicate to the Federal Government that the States, and certainly a State like Vermont, have not for one moment lapsed into a casual or an indifferent state in terms of the environment. It is something we make a very strong commitment to, both financially and in terms of our own law.

Clearly there are limits to what the States can do. That is why the continued assistance of the Federal Government both in law and in financial assistance is critical. We cannot do it alone. Especially in areas that know no State boundaries, and most of these issues that we raise are precisely of that nature. Much as we sometimes have that sentimental desire to create a wall around Vermont to keep certain things out and other things in, we know we can't do that, and we certainly can't do it in such areas as air quality and water quality and some of the other issues that will be raised today.

Let me also congratulate you on your leadership in winning unanimous Senate approval for the Clean Water Act amendments of 1985. We are particularly pleased with the increased allocation to Vermont of sewer construction funding, and we also believe that the Senate version presents a logical and workable bridge toward the establishment of State revolving loan programs as a long-range strategy of wastewater treatment facility financing.

You will be hearing today from several people within the agency of environmental conservation and the health department. They will be talking about three topics, acid deposition, hazardous air pollutants, and ground water. I will limit my remarks to two areas of particular concern to me in addition to those others.

One is the Department of Energy search for a high level nuclear waste repository. I understand that this may not be considered to be a matter within your committee's jurisdiction, but I suspect that you've gotten a considerable amount of mail on this subject and you are keenly aware of how important this issue is to the State of Vermont. The second is the so-called tall stacks regulation recently issued by the Environmental Protection Agency.

I won't go into great detail on the high level waste problem, I am submitting for the record a letter I wrote sometime ago to Secretary Harrington regarding my concerns. They really are based on two areas. One is I question the scientific validity of DOE's basic assumption the rock formations exist in the east that are appropriate for safe nuclear waste storage. I think there is considerable question about whether that is accurate. The second concern that any rural State, particularly Vermont, is that the search eliminates rock formations in all but sparsely settled areas. So, there definitely is a rural bias that I believe works against the State of Vermont.

My view, if you find a safe location it should be safe anywhere, regardless of population density. Another concern that I believe is important to point out is that these wastes do have to be transported. Vermont does not have the best terrain, nor do we have the best climate for the transportation of these high level wastes to depository sites.

Finally, because the process is so long, it's supposed to take into the next century to make some final decisions. All that time for further study and analysis will place these regions that have been singled out under a heavy cloud for a protracted area. You might loose further population because of that potential selection site. Obviously, you increase anxiety and you have an impact on the economy.

I believe that the Congress should take another hard look at this entire process. Reconsideration of DOE's statutory mandate is urgently needed. Evaluation of the scientific validity of the crystalline rock project is imperative, and a thorough review of DOE's procedures should be initiated.

On the tall stacks issue I know that you are very familiar with this issue. I must express my disappointment that the Environmental Protection Agency has failed miserably, once again, in carrying out its statutory obligations as spelled out in the Clean Air Act in current court decisions.

As we know, there are two ways of controlling the amount of emissions that reach the atmosphere. One is to control it at the source, and two is to try to disperse it.

The dispersal strategy, while helping the immediate area, certainly does not help States like Vermont. We find that these revised regulations are flawed, not reflecting the intent of the courts or the Clean Air Act.

Specifically, we do not agree with EPA's position on when emission credits due to stack height can be used instead of emission controls. In our view, the major issue is controls. We believe in a more strict definition of stack height credit as a dispersion technique as defined by Congress. I know that you have some legislation that you are sponsoring in this area. Whatever is possible to get that legislation passed, we certainly encourage you to initiate.

I realize that the refrain from the administration, from certain Members of Congress has been that we need more study, we need more time. I believe that we cannot continue the stalemate on acid rain legislation.

We will be presenting, shortly, our evidence of serious problems of visable impairment, forest damage and aquatic impact which we are persuaded are related to the transport and deposition of sulfates and other pollutants from outside our borders. We pay for other's pollution. The economic costs are real.

One of the central questions, I know from the NGA, is who pays, There seems to be agreement, yes let's try to do something, but who bears the cost. Well, it is my claim, and I am sure you agree Senator, that Vermont is bearing the cost right now. The recently released study of progress put the price tag of acid rain pollution at $5 billion for a 17-State region. That doesn't include the effects on health or possible effects on forestland.

I ask you to give careful consideration to these two areas of major concern to the State of Vermont, the high level nuclear waste disposal question and acid rain.

On the acid rain issue, I believe we can simply no longer tolerate delay. I, personally, feel a sense of urgency. Even the scientists are saying, and I heard some presentations at a recent New England Governors and Canadian Premieres conference, they are saying don't wait for us to cross all the t's and dot all the i's, because by then it may be too late.

We learned from Germany's experience in the Black Forest that if you wait too long the process is irreversible. We see some damage occurring today at the top of Camels Hump. There will be further testimony in that regard, and I am afraid that this will not be an isolated occurrence but will, in the future, be witnessed in various parts of the country. It is action in the U.S. Congress which can and must set the agenda for a strong national policy which states that the control of acid rain is a national not a regional responsibility.

On the issue of high level nuclear waste disposal, I urge you to make this a national issue as well. It is not only Vermont's concern because Vermont is a potential disposal site, it is a national problem which requires sensible action. The present plan is unworkable. Let us strive for a more realistic solution to the safe storage of these wastes.

Thank you kindly for giving us the opportunity to state our case. I'll be happy to answer questions, and you will also get more detailed presentations from various people within the administration. Thank you.

Senator STAFFORD. Thank you very much, Governor. I am in full agreement with what you've said. You and I both know that when somebody doesn't want to do something but doesn't want to admit it, the tactic is to appoint another committee and tell them to study the problem for another 2 years. Unfortunately that's what has been going on in Washington, and I'm embarrassed to have to say that since I'm in the administration's party. But, that, frankly, is what is going on.

I personally, deplore it. As far as acid rain is concerned I think the evidence convinces any normal person beyond a reasonable doubt that the time for study is over and the time for action is now.

I wanted to comment also on the nuclear waste issue in which, again, I find myself, personally, in agreement with what you have said as far as Vermont is concerned. Nuclear waste is a national problem, and it's about as popular in the other 49 States as it is here in Vermont. So, it's an acute national problem.

One thing the Department of Energy has not given adequate attention to, in my opinion, is the question of transportation of nuclear waste which we, Senator Hart and I, are asking the Department to take a harder look at in terms of legislation we are proposing for the Senate's consideration. We think that's one of the keys to the selection of a locale, and it's an issue that has not been properly considered either for Vermont or for any other State that might be selected as a repository.

I know that you've been involved in the National Governor's Conference discussion with respect to acid deposition reduction, are you in a position to comment on the 10-million-ton reduction annually over a 10-year period that I believe the Governor's Conference has endorsed and the extent you see support for doing something now about acid rain? Precisely how great is the support there? Is it overwhelming? If you could give us your thoughts that would be helpful.

Governor KUNIN. I think it's strong, but it is not overwhelming since obviously the National Governor's Association reflects the geographic differences the Congress does to a degree. But, it is growing.

In Boise, ID, next month, most of the Canadian Premieres are going to be attending a conference for the specific purpose of expressing their very strong concern about acid rain. At a recent New England Governors and Canadian Premiers meeting, the New England States and the eastern Canadian provinces set specific emission limits, as you may know. I think that added pressure, plus we anticipate that the two envoys were appointed as a result of the meeting between Prime Minister Mulrooney and President Reagan.

What we can do from the Governor's Association is provide you with some of the pressure that I believe the Congress needs in order to move. Certainly there will be some dissent from the coproducing States, but I believe the pressure is mounting. I think the opportunity to create a larger consensus exists.

I also intend to try to have some one-on-one conversations with individual Governors from States that may not be considered favorable toward this issue and just to see what kind of dialog we can establish. I think we have to move off the polarization ground and move toward a ground that we can get some action.

Although Vermont's position has always been the polluter shall pay, we will pay something to reverse this present trend. I think the trend hit me most poignantly when I received a letter from a schoolchild not too long ago who had been doing a study on acid rain. She has some wonderful lines in that letter. One of which was when she saw the pictures of the trees and the lakes dying she said, "it got to my heart." I think that's what is happening to schoolchildren and that is what is happening around the country. Hopefully, it will get to the heart of Congress as well.

Senator **Stafford**. It probably would not serve our purposes this morning, but I could almost name for you the Governors who would oppose acid rain legislation, State by State, at this point. It may be that some tactic could be devised that would win some of them over.

Well, Governor, I can't tell you how grateful I am that you've come. I can assure you that we will do our best in this Congress to get some meaningful, national acid rain legislation. It is a national problem. Wind currents respect no State boundaries, nor any international boundaries, so it is a North American Continent problem as well as a State problem. That is why all the Canadian Prime Ministers are interested in it also. Thank you, again, Governor.

Governor **Kunin**. Thank you very much, Senator.

Senator **Stafford**. The first panel this morning, discussing acid rain, will be Leonard Wilson, secretary of the Vermont Agency of Environmental Conservation——

Mr. **Lash**. Senator, I will be substituting for Secretary Wilson.

Senator **Stafford**. All right. Mr. Richard Poirot, air quality planner, department of water resources and environmental engineering, Vermont Agency on Environmental Conservation, Mr. Wallace McLean, chief of the monitoring and surveillance section of the same agency, and Dr. Richard Klein, professor, botany department, University of Vermont, Burlington, VT. The Chair's intention, gentlemen, would be to take you in the order in which we called your names. That would mean that Mr. Lash would be going first instead of Leonard Wilson. Let me say to all of you in view of the constraints on our time, and the necessity of this Senator being back in Washington for late afternoon votes around 6 o'clock, that we are asking each witness to limit their testimony to not to exceed 10 minutes. Where a prepared statement has been given to us, it will appear in the record in full and you won't need to ask permission for that. That will be done anyway. So, if you can summarize the statements in less than 10 minutes we will appreciate it so we can hear everybody before we have to leave. Mr. Lash, we will welcome your testimony.

STATEMENT OF JONATHAN LASH, COMMISSIONER, DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING, VERMONT AGENCY OF ENVIRONMENTAL CONSERVATION

Mr. Lash. Thank you, Senator. I am very pleased to have the opportunity to appear before you in Vermont instead of, as on many occasions in the past, in a hearing room in Washington.

I would like first to communicate Secretary Wilson's apologies. He is representing the New England States in an organization of environmental secretaries which will be meeting with EPA administrator, Lee Thomas, and he felt that it was a good opportunity to talk about the very same issues that we are talking about today and decided I could represent him.

I can present my testimony in substantially less than 10 minutes because I really just want to introduce the members of my staff.

I would just reiterate one thing, very briefly, what the Governor said. We are quite aware of the reasons for the difficulty of congressional action on acid rain. One of the things that has troubled us is the failure of EPA to act not only in the tall stacks regulations, but under a number of statutory provisions where they could and should take actions which would reduce sulfur admissions and have not done so. Richard Poirot will talk about one of those areas, visibility protection in which Vermont is attempting to take an innovative approach.

Tall stacks is another area. We have the international pollution abatement efforts that were made in 1980 to have reciprocal action with Canada. The interstate transportation effort there was a law suit which failed, and we are at the point of throwing up our hands and wondering what there is that one State can do while we accumulate data showing the effects.

I don't think there is any need to go back over the State's position. As you know, we are supporting legislation. Secretary Wilson hopes that, not only in Boise but subsequently, there is a possibility of developing what is called the doughnut coalition, some kind of cooperation among the Eastern States, the Western States and the States of the Southwest which might provide sufficient support for legislation. I see little possibility that anything will happen this year, but I hope that next year we will have the opportunity to come before you with a new proposal.

Mr. Poirot will talk about the efforts being made to develop a new approach in our air program. Mr. McLean will talk about the data we've been collecting on the aquatic effects of acid rain. It probably would make more sense for you to start, Rich. He has some slides.

STATEMENT OF RICHARD POIROT, AIR QUALITY PLANNER DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING VERMONT AGENCY OF ENVIRONMENTAL CONSERVATION

Mr. POIROT. If I could make just one point this morning, Senator, that would be that in the northeastern United States acid rain and visibility impairment are two symptoms of a single problem. The problem is that the North American emissions of sulfur dioxide are considerably in excess of what the environment can possibly tolerate.

Senator STAFFORD. Let me ask you a question, if I might. The visibility problem in the northeastern United States, what color would the haze be on the horizon if you were flying a small airplane at 4,000 or 5,000 feet?

Mr. POIROT. White. Like today, in fact.

Senator STAFFORD. Known in the air trade as marginal VFR smoke and haze. I've seen a lot of it in my time. Excuse me.

Mr. POIROT. My written testimony focuses primarily on our recent efforts to attempt to utilize section 169(a) of the Clean Air Act, which calls for implementation plans to protect visibility in States that contain federally mandatory class one areas. We have one such area in Vermont in the Lye Brook Wilderness down in the Manchester, Sunderland area.

EPA has effectively sidestepped, or avoided, the regional haze issue under section 169(a) by dividing visibility impairment up into two different categories to be addressed in two different phases. In phase one we are to be dealing with this so-called problem of plume blight visibility impairment that is readily traceable to individual nearby sources of air pollution. And, phase two to be addressed at some as yet unspecified future date we'll finally be getting around to addressing regional haze, presumably when we understand the regional haze problem better.

Our position in our visibility plan is that not only do we understand regional haze fully enough at the present time to address it at the present time, but also that the act demands that we make an attempt to address it.

This map that you can't see very clearly shows the areas in the State of Vermont in addition to Lye Brook that we have designated as sensitive for the purposes of visibility protection. These are defined, tentatively, as elevations in excess of 2,500 feet. These areas of visibility protection also happen to coincide with those areas that we think are most sensitive to acid rain damage as well.

These black circles are the results of our running of a very conservative screening model to indicate the maximum extent of plume blight that might result from any existing Vermont source under worst case conditions. None of the circles and none of the sensitive areas, including Lye Brook, coincide. This is our conclusive determination that plume blight does not exist, and not only in Lye Brook, but in any sensitive area.

Visibility impairment that does occur occurs on a widespread regional basis. This is a comparison of visual range from Albany, NY and Burlington, VT, sight separation of about 130 miles during a summer month in 1978. You can see there is a very tight agreement between visibility at Burlington and at Albany, a periodic rise and fall of clean days and hazy days that occurs on a regional scale of at least the size of the State of Vermont.

This is the first of a series of four slides that we first presented before your committee, actually 2 years ago, Senator Humphrey presiding. This depicts the arrival of a single sulfate episode into the State of Vermont and consequent effects on visibility. Here we are looking south from the top of Mt. Mansfield down the spine of the Green Mountains. This is Bolton Mountain here about 5 miles away, Camels Hump 15 miles, and you can barely see Mt. Ellen about 30 miles off.

We understand this episode a little better now than we did 2 years ago, but I would just like to go over it quickly. It's also an episode that has been characterized by an elemental tracer technique developed by Dr. Kenneth Rahn at the University of Rhode Island as being clearly and distinctly an episode of midwestern origin. Just go back 1 microgram per cubic meter of sulfate on this day. The following day sulfate climbs to 6 micrograms per cubic meter and we loose Mt. Ellen and Camels Hump is just barely visible. You have to know where it is to see it.

Senator STAFFORD. Mr. Poirot, if I could interrupt there for just a minute, we had one scientist before our committee in the last Congress who told us that whatever visibility problems and acid rain problems we had in Vermont we were generating here within the State. I think you testified a little earlier that there are no plumes in Vermont. I might say, this scientist disagreed with 16 out of the 18 scientists who were appearing before our committee. But, he was from Albany, NY. I would gather that you might disagree with what he said also?

Mr. POIROT. Yes; there is one in every crowd. As a matter of fact, there has been some discussion that Albany, NY, is the only possible location where plume blight might be perceptible in Vermont. We believe by far, the majority of the impairment is the result of regional haze. In fact we can document that 85 percent of the variation in light extinction, which is just a fancy term for the inverse visible range, 85 percent of that variation is the result of sulfate particular transported into the State.

Six micrograms per cubic meter, 13 micrograms per cubic meter, influence the midwestern trace elements in the aerosol this day. Finally, the episode peaks at 35 micrograms per cubic meter, complete domination of the midwestern aerosol according to this elemental tracer technique.

This episode of sulfate and poor visibility ended about 8 hours after this picture was taken in conjunction with a rain event, pH 3.47. So, the solution to regional haze is, unfortunately, acid rain. This is an entirely different way of looking at the origin of this particular episode. These blue lines are the paths that the air traveled prior to arriving here in Vermont on the first cleanest day of the episode that I showed you. The red lines are the path that the air traveled prior to arriving on the final dirtiest day.

Senator STAFFORD. Some of those lines originate up in Canada or over Lake Superior.

Mr. POIROT. That's right. These lines, and these little stars, I don't know if you can see them, are separated by 6-hour time intervals. So, if these are close together, that means there is stagnation. However, these blue lines are the projectories arriving on the clean day. When air stagnates over Canada we expect to see a clean day here in Vermont. If it stagnates down here over the Midwest we expect to see a dirty day. This is only one episode.

We haven't, since this time, examined in great detail hundreds and hundreds of individual projected calculations over a period of three entire summers. We find that when we experience a clean day here in Vermont the air is likely to have previously resided in the Northwest, and when we look at the same probability, where is the air most likely to have been before it gets to Vermont. On a dirty day that pattern dramatically shifts to the southwest.

Now, we can increase the probabilities for a clean day and the same probability for a dirty day. You can see we start to zero in on specific source regions for a clean day, for a dirty day, clean day, dirty day. Region of highest probability prior location before arriving in Vermont resulting in a high sulfate, poor visibility day. These areas not only coincide with areas of extremely high emission density, but also areas of extremely poor controlled emissions and tall stacks.

One last episode, this is a view from Battery Park looking across Lake Champlain to the Adirondacks. This is a statute of General Lee in Wells. We happened to notice while we were in the park, this plaque is on the base on that statute, and this etching is very dramatic. You can actually run your finger over this and feel the etching where the rain water has run down on this bronze plaque.

The reason we were in Battery Park was to take a few photographs of the Adirondacks that we hoped to use in performing an economic assessment of the value of visibility in Vermont. This wasn't the cleanest day we've ever seen, but, as it turns out, it was one of the clearest days in all of August last summer. For some reason, summer of 1984, we believe, was the dirtiest single summer that we've seen in Vermont in the past 15 years. This was one of the clearest days.

Some of these Adirondacks peaks are probably 30 miles distant from this State. Two weeks earlier from the same location this was the view. We estimate that this is about 20 micrograms of sulfate. The humidity on this day was extremely low, only 45 percent. This is not fog, this is haze. This is sulfate.

I wanted to end with this episode because it was prolonged over a period of about a week. Actually sulfate even got higher than this, if you can believe it, over the following 2 days. It happened to coincide with a prolonged episode of cloud water deposition at high elevation ecosystems throughout the entire Northeastern United States of pH 2.97 to 2.80, acid rain, acid cloud water, regional haze. All the same problem and require the same solution.

Senator STAFFORD. Can I ask you, Mr. Poirot, was there a nitrogen content in the haze that you have been describing?

Mr. POIROT. We didn't measure for a nitrate component. However, our feeling is that at warm ambient temperatures such as during the summer season, almost none of the nitrate would exist in the atmosphere. It exists in a particle phase. And, if it is in gaseous form, it could impair visibility. But, the concentrations here aren't nearly high enough to do that. Also, you may notice there is no yellow tint to this haze. It's a washed out whiteout effect. No indication of the presence of nitrate. That's all.

Senator **Stafford**. Thank you for a very interesting presentation. The next witness will be Mr. McLean who is the chief of Monitoring and Surveillance Section. Mr. McLean we would be glad to hear from you.

STATEMENT OF WALLACE McLEAN, CHIEF, MONITORING AND SURVEILLANCE SECTION, DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING, VERMONT AGENCY OF ENVIRONMENTAL CONSERVATION

Mr. **McLean**. Thank you, Senator. I am going to shift into the water area now and our findings of what we found with regards to the impact of acid rain on the State's surface water and aquatic ecosystems. The department initiated its first acid rain studies in late 1979 by examining 20 lakes. In the early 1980's the department produced a statewide sensitivity map which is here to my rear. It is also attached to my testimony, Senator. [The map has been retained in committee files.]

The basis for this map was an examination of the State's bedrock geology in terms of its buffering capacity. Upon examination of that particular map, the following information becomes readily apparent: The bedrock which forms the spine of the Green Mountain range has little or no buffering capacity; isolated but significant pockets of granitic bedrock in the northeastern areas of the State have little or no buffering capacity; and, the significant areas of the western foothills of the Green Mountains have medium to low buffering capacity. In summary, every major watershed in the State contains geologically sensitive areas.

When lake alkalinity data from department studies are plotted on the sensitivity map, it becomes readily apparent that the map is a good indicator of the sensitive areas. In order to verify the sensitivity of a particular lake, it is necessary to collect actual water quality data since there are other factors that determine sensitivity besides bedrock type.

I would like to state at this time that a recent released draft map which the U.S. Environmental Protection Agency depicts regions of similar surface water alkalinity in the northeast portion of the country, with respect to the map for Vermont it is in very close agreement with the map produced by Vermont. It is the opinion of the department that the new map does not reveal significant additional information about Vermont, however.

Since our initial studies in the late 1970's, over 200 lakes in the State have been studied and classified according to the sensitivity of the certification based upon the measurements of alkalinity. I have also prepared a table which accompanies my written testimony which reflects the sensitivity mapping or ranking within the State.

In summary, based upon the 200 lakes surveyed, 6 lakes are critically acidified meaning that they have no means of buffering against future acid inputs. These lakes represent less than 1 percent of the State's surface waters, but collectively add up in excess of 100 acres. Twenty-four lakes representing over 2,000 acres or something on the order of 5 percent were found to be extremely sensitive with alkalinity levels between 0 and 2.5. Thirty lakes, as classified, based upon the alkalinity levels were between 2.5 and 5. These lakes represent over 3,000 acres or 6 percent. Forty-eight lakes have been classified as moderately sensitive with alkalinity levels between 2.5 to 12.5 mg. per liter. This represents over 5,000 acres or 10 percent.

In summary, 108 lakes representing in excess of 11,000 acres, or 21 percent of the State's lake surface areas, that's exclusive of Lake Champlain and Lake Memphremagog, are likely to incur some quality degradation with continue acid deposition at its current levels.

The department has selected 36 of these 200 lakes which it will study over the next 10 years. This program has been made possible by funding from the Environmental Protection Agency out of Corvallis, OR. Without these monitoring and surveillance funds, the department would essentially have to suspend its current acid rain activities. The primary purpose of the monitoring activity is to establish trends in measured chemicals variables and in biological populations.

From a biological standpoint, the department has initiated studies to evaluate fisheries, zooplankton, phytoplankton, and macroinvertebrate populations. We have completed our first round of fisheries, Senator.

Fishery surveys revealed to date that two lakes are currently fishless. That is Haystack Pond in Wilmington and Little Pond in Woodford. It is highly probable that acid conditions in these ponds are responsible for these lakes being unable to sustain fisheries. They have, in the past, both supported viable fisheries. Existing smallmouth bass populations in several other lakes are currently threatened. The pH levels in Grout Pond in Stratton, Sunset Lake in Marlboro, Harwood Pond in Elmore, and Somerset Reservoir in Somerset are near the critical level for smallmouth bass. Future inputs of acidic deposition, again, could endanger their capability to reproduce.

The studies have also revealed that as acidity increases the number of fish species decreases. This is essentially in our clear water lakes as opposed to our cold lakes. Clear water lakes also show that there is a reduction in our zooplankton and phytoplankton populations with increased acidity levels. The sensitive components of the macroinvertebrate communities, such as our crustaceans, mollusca, and our mayflies have been significantly reduced with increased acidity. In 1983 the department extended its lake studies into stream monitoring, especially in our high order streams to evaluate seasonable variations in stream chemistry and in the biological community.

In summary, stream alkalinity levels were reduced to all streams following increased stream flows resulting from snowmelt and acidic deposition. In our high order streams, which are normally low in alkalinity levels, drastic decreases in pH followed the loss of available aklalinity during periods of acidic precipitation and snowmelt.

Levels of dissolved aluminum have increased to a point where they have been implicated in some biological toxicity problems. A majority of Vermont's major river watersheds have their headwaters in the sensitive Green Mountains. Some major watersheds in the southern Vermont area are most totally underlaid by bedrock formations which are extremely sensitive. The West River watershed where a major effort is currently underway to restore an anadromous Atlantic salmon population is such an example. Eighteen high order streams in Vermont have been studied. All these conditions are recorded for the majority of these high order streams.

I would like to report at this time, Senator, that Vermont's citizens are greatly interested in acid rain. Since 1980 the department has sponsored what we refer to as an Acid Rain Lay Monitoring Program. The purpose of the program was to determine the range and the temporal and spatial patterns of pH of Vermont's precipitation. Currently, citizen volunteers operate 11 monitoring sites using equipment supplied by the department. Annual data reports are published by the department utilizing this information.

In addition to the department's sponsored Lay Monitoring Program, the department has assisted in monitoring efforts currently underway by the Conservation Society of southern Vermont to monitor the pH precipitation and surface waters in southern Vermont. This program effort is also being supported in part by the University of Vermont, University of Massachusetts and Dartmouth College. Additional monitoring efforts at the citizen level have also been undertaken by the Lake Champlain volunteer committee within the Lake Champlain Basin. It is obvious that Vermonters are interested and concerned as evidence by the time and effort put into these different programs. Thank you, Senator.

Senator STAFFORD. Thank you very much, Mr. McLean, have you run any studies on Lake Champlain itself as to acidity?

Mr. McLEAN. Lake Champlain, Senator, has a high level of alkalinity at the present time. Our feeling is that it is not impacted presently.

Senator STAFFORD. All right, thank you. I remember once getting involved in a discussion with some scientist from another part of the country, and I remember saying, if Lake Champlain became highly acidic what could be done about it. And, he said, why lime it. I said I wonder how you lime a lake that is 115 miles long and almost 400 feet deep in places. Well, he had no answer for that.

You are discussing some of our lakes which are almost devoid of life. I remember going to Muskoka Lakes near Toronto in Ontario last summer and looking at the beautiful clear water in one of the lakes. You could see down maybe 30 feet in the lake. The reason was that there wasn't a single living cell in that entire lake. Not even plankton could live in it, it was a totally dead lake. That's something I hope we can prevent having happen here in Vermont or anywhere in this country, for that matter.

Well, I thank you for your very interesting testimony. The last witness on this panel will be Dr. Klein. We are grateful that again you are willing to help this committee, Doctor. We will note for the record that not only are you here but your wife who is on faculty at St. Michaels is here as well. So, we've got two of our better institutions of higher learning represented here in the room.

STATEMENT OF RICHARD KLEIN, PROFESSOR, BOTANY DEPARTMENT, UNIVERSITY OF VERMONT

Dr. KLEIN. Senator Stafford, this is the fourth time I have presented information on forest decline in New England before your committee. At each hearing my testimony has become increasingly pessimistic and I regret that this time it is even gloomier.

The acidic deposition project of the botany department at the university, codirected by Dr. Vogelmann and myself, has conducted surveys on our major study mountain which is Camels Hump at all elevations as well as other Vermont mountains. We have the most comprehensive data base in North America on forest decline. One need not have to have the quantitative data that we do have to know that something very serious is happening in Vermont and other forests. Simple visual inspection of the mountains will show that there is essentially a disaster in progress.

This is Camels Hump in 1963. It is bright green. It is healthy. Here is Camels Hump in 1983, 20 years later. You can see that there is extensive death of trees as evidenced by these rather horrible looking gray blotches. Let's zero in just a little bit. These are upper elevations on Camels Hump, photographs taken between 1983 and July of this year.

If we examine the total amount of living plant or tree material on Camels Hump, in the dotted line, the montane zone which is the primarily coniferous forest, it has dropped about 40 percent. If we examine the three species that make up the primary trees on Camels Hump Mountain, the balsam fir held its own between 1965 and 1979 and is now decreased by 19 percent. White birch also held its own between 1965 and 1979 and has subsequently decreased by 30 percent. Red spruce began its decline probably prior to 1965. The rate has continued, and although the statistics do not prove this, there appears to be a small acceleration in the amount of red spruce death since 1979.

Here is a photograph taken down the slope of Camels Hump with an ordinary camera. We have in the last year made arrangements with NASA and with the Jet Propulsion Laboratory to utilize Camels Hump and other Vermont mountains as the primary site for an attempt to evaluate the possibility of using remote sensing as a technique to identify areas that have not received survey. We were selected by NASA simply because we do have the data base that we do. So, this is an ordinary photograph.

If one looks, however, at an infrared photograph, the trees that are green are dead. The trees that are red are alive. This is false color infrared photography. We have also utilized overflights with the multispectral range instrumentation of NASA and JPL, and the picture is precisely the same. Not only for Camels Hump but also for Bolton Mountain, Jay Peak, Mount Abraham, parts of Mount Ellen and we can continue this litany of disaster throughout the whole Northeast part of the United States.

This litany of disaster is not restricted merely to the northeast part of the United States. The evidence is excellent for eastern Canada all the way down through the Appalachian Mountain chain into and including parts of Florida and some studies, albeit incompleted, indicated that our Western mountains are beginning to show the same sort of damage that exists in the East as well as in most of Europe. Essentially forest decline is a fact of life today, and in North American as a whole as it is in Europe.

A significant portion of our work has been designed to determine with precision the temporal relationships of tree decline both to obtain measures of the rates of tree decline and see if it is possible to find what the lawyers call a smoking gun. We are using techniques in which the number and width of tree rings are dated, it's called dendrochronology, and are chemically analyzing specific time spans within this wood.

We have found that vanadium, which I emphasize is not a natural constituent in Vermont soils, has accumulated. This is a red spruce tree taken from 1884 to 1981 when the tree died, and you can see that the tree rings started out small which is perfectly normal, reached a level, slight peak, and then plateaued until roughly 1950 when the vigor of the tree is evidenced by its ability to put on rings declined and the tree finally died.

Now, keep this time, around 1950, in mind. What we did using red spruce, as well as sugar maple, is to examine the amount of vanadium that it accumulated in the wood during this period. You can see that again vanadium was essentially absent, statistically, until the 1940, 1950 period when again in the case of both the spruce and the maple there was a highly significant increase in the amount of vanadium which had been deposited on Vermont soil primarily as a result of fossil fuel combustion, was solubilized by acidic precipitation, taken up by the plant and is accumulated in the wood.

This serves, we believe, as something that does begin to reach the point of a smoking gun and also begins to date for us the advent of widely dispersed acidic metal containing precipitation that has reached Vermont. The search for the cause of the decline has occupied the attention of scientists throughout the world. As a base we have the meteorological information assuring that the precipitations are 15 to 25 times more acid, they contain metals which are accumulating in the soil, solubilized and can be taken up by a plant.

Calcium and magnesium which are vital for plant growth are being leached down below the level where the plants can get them. We have the data on that. We know the gaseous pollutants, ozone and PAN, are damaging plants. The State of Vermont has been denied funding to obtain the equipment to allow us to do monitoring of these gases, but we have seen clear symptoms on the trees that indicate that ozone damage previously undescribed is beginning to accumulate in our forests. Thus, we have quantitative data for severe forest damage, meteorological and monitoring evidence for a diverse range of pollutants.

From a legislative point of view, it is important to evaluate whether there is a direct cause and effect relationship between these two sets of irrefutable facts. Put bluntly, this is an impossible task.

I have indicated that acidity, toxic metals, at least three gaseous pollutants, depletion of required nutrients, alterations in a variety of forest conditions including nutrient cycling, and accumulation of nitrate and sulfate in the soil are all impacting upon these forests.

When it is also recognized that stresses all interact one with another that the mix of the stresses varies in time and in space, that weather patterns are inconstant and that there are species and indeed even intraspecific genetic difference among the plants, the number of possible interactions simply boggles the mind.

A considerable proportion of our energies are devoted to experiments in which we attempt to evaluate the effects of these stresses on plants. It is physically impossible to conduct a study or even a group of studies that allows us to cover the range and the interactions among all of these pollutions.

One of the reasons for this is that we know that these pollution stresses are not all direct. Thus, a damage to the root system of a plant will result in damage to the top of the plants resulting in defoliation. Damage to the top of the plant effects the process of photosynthesis and ends up damaging the root systems as well. We also know that laboratories are not reality, and we further note that the sequence from initial injury, initial stress, to final decline and eventual death of a tree takes 5 to 10 years. Nevertheless, we and a few other laboratories have accumulated a significant body of information that leads inexorably to the conclusion that anthropogenic pollutions, acid deposition, metals, and gaseous pollutants are the most probable causal complex of forest decline. We have experimental evidence that observed declines in the amount of moss on the forest floor, the decrease in the breakdown of litter, the alteration in nutrient cycling, the uptake of water by plants, the activity of soil microorganisms, root damage, foliar damage, and many other factors are also affected by present conditions.

Even assuming that these stresses are additive and not interactive and synergistic, and the evidence we are accumulating indicates that they indeed are interactive, the more than sufficient numbers and amounts of pollution stress to account for the observed forest decline. I must emphasize, however, that proof in the legal or even in the scientific sense that these pollution stresses are truly causal is not, nor will it ever be, adequate.

We have a situation in which the probability that known and suspected anthropogenic pollutants are causal is very high, at least 70 percent and possibly up to 80 percent sure. Any prudent person will carry an umbrella when the probability of rain is 50 percent and will also wear a raincoat when the weatherperson tells you that the rain probability is 70 percent. Our Nation has made profound decisions with much lower probabilities. And, if projections of our data are correct, we haven't got too much longer to make up our collective minds.

Eighty percent of the red spruce on Camels Hump are dead or dying, the species is not reproducing, and other species, both conifers and hardwoods, are showing significant declines.

I would like to conclude my testimony with a matter that has not received the attention that it must receive. The primary emphasis in legislative thinking is the vitally necessary reductions in the amount of sulfur emitted into the atmosphere. However, even if the ultimate goal of a 50-percent reduction in sulfur dioxide is achieved, there will be enough NO_x and thus nitric acid and enough metal and gaseous pollutants to maintain severe stress conditions in our forest. In spite of irresponsible statements to the contrary, the technology exists now to achieve reductions in sulfur, nitrogen, metals, and gases that can relieve the now impossibly severe stresses being experienced by our natural resources. Thank you, Senator, for this opportunity.

Senator STAFFORD. Thank you very much, Doctor Klein. We appreciate the information you have supplied the committee in the past and your testimony here this morning, as you say, for the fourth time. As I listen to your testimony I was reminded, although I wasn't here to hear it personally, that the vice president of International Paper for Science on an occasion of his visit up here, and he repeated this to me in Washington, ascribed the conditions on Camels Hump that you just described, ascribed them to drought and nothing else. I take it that first of all evidence of drought to support that thesis probably has not existed and that you would be in disagreement with what he said.

Dr. KLEIN. Very much so, Senator. The reported drought as a participant in forest decline was made by two scientists, one of whom had already published data, which he conveniently ignored, that demonstrated that Camels Hump, the upper elevations in Vermont, New Hampshire, Maine, and upper New York, during the period of this drought which was measured at low elevation airports did not exist in the high mountains and the soil up there was at full water holding capacity.

When it was pointed out to this investigator that he made this original statement, which other people had also found, he said, well, one of these days I will have to retract the paper. It has now been 5 years. He has not retracted the paper. The evidence for drought being a causal factor is negligibly small. The drought can be involved as an auxiliary factor is without question. Studies going on both in our laboratory and in the field work now have demonstrated that the participation of drought in the damage that I am reporting to you that is being reported elsewhere as well, may account at most for 5 percent of the damage. And, we are being generous at that point.

Senator STAFFORD. That would be true, also, I guess, in the damage being done in the so-called Black Forest and other forest areas in Switzerland as well as Germany.

Dr. KLEIN. Yes; I spent some time in Germany supported by funds from the EPA, and then the German scientists were sent over here to Camels Hump supported by the West German Government. We evaluated at considerable length the drought hypothesis and other hypotheses both experimentally and in the basis of our experience and came to precisely the same conclusion. It is not a drought problem. It is not a disease problem. It is not an insect problem. It is, you've heard this many times before, a people problem.

Senator STAFFORD. You said something in the course of your testimony about a 70-percent probability that acid deposition is the major factor in the damage to tree growth on Camels Hump. That reminded me that I've tried to establish a test for myself, based on scientific certainty gathered from scientists testimony, not on a layman's view like my own, as to when there was sufficient proof that we ought to act and stop studying. Or not stop studying but acting on the basis of studies up to the present time. I guess we should never stop studying. In any event, I have fallen back on the measure of legal proof and the highest test that our judicial system requires in criminal cases, and it has appeared to me that when the evidence is convincing beyond a reasonable doubt that action should be taken. That we've reached the point where we must act. More study may further confirm the action, but the point has been reached when it is time to take action. I guess you would agree with that?

Dr. **KLEIN**. Yes.

Senator **STAFFORD**. And 70 percent certainly sounds like conviction beyond a reasonable doubt to this Senator. Based upon the evidence that you and your colleagues have developed on trees at the upper level of Camels Hump, would you expect to anticipate declines in forest productivity at low levels as time goes by?

Dr. **KLEIN**. Of great interest in the whole Northeast and certainly in Vermont is the situation in relation to the State tree, the sugar maple. The evidence that we have now has indicated that there is a decline in sugar maple vigor and in number of stems on a unit of limb in the order of 25 to 30 percent.

There is anecdotal evidence from all over the State, and the Botany Department has received this and we are in contact with our opposite numbers in New York State where I understand they make an inferior product that they also call maple syrup, and also the Canadians as well, that anecdotally the growers, the men and women who have lived with their sugar bushes for what, three generations, four generations, are saying there is something seriously wrong. This is reaching crescendo now.

There is an organized study by the Canadian Government. There is no such study at all being done in the United States. But, reliable individual growers are reporting that their trees are declining. That branches are dying. That certain parts of their sugar bush yields are falling off and there are off flavors. A whole litany of things are beginning to appear that makes us worry a great deal.

In addition, we also know that the sugar maple tree is an important source of cabinet wood. We have no idea what kind of an impact that is likely to have. The market for hard rock maple is depressed at the moment and nobody knows what is going to happen. But, certainly one must also add the esthetics of the sugar maple tree. There is this thing called leaf season which has a tremendous impact on the Nation's view of Vermont as well as the Vermont economy. There is some increasing evidence as well that in impacted areas the colors don't have the vitality that we are used to. It is loose, but it is there.

Senator **STAFFORD**. Thank you, Doctor. I don't want to clutter this record up with any trivial recollections, but I can't resist recalling that one long gone U.S. commissioner of education, in Washington, once was reported in a national magazine to say that he always looked forward to going back to New Hampshire in the fall to take part in harvesting maple syrup. That explained to me why, (*a*) he was not a very good commissioner, and (*b*) the maple syrup in New Hampshire may have been inferior to our own. One last question, Doctor, is the forest industry in Vermont and elsewhere concerned about what you and your colleagues are finding in your studies with respect to Camels Hump.

Dr. **Klein**. Senator, this has been one of our major frustrations. Every time we start talking to the forest industry they look us square in the eye and say, this is proprietary information. We've had a number of them visit our laboratories. Our data, of course, is made available freely to them. We do not know, first, what their concern is, second, whether there is any impact, and third, whether they are doing anything about it. This is true not only for Vermont, it is also true quite literally across North America. The situation in Europe where the commercial forester works very, very closely with State and local governments as well as the scientists is something which does not exist in North America. I can't answer your question.

Senator **Stafford**. Well, Doctor, thank you very much indeed. I have some other questions which if it is agreeable to you I may submit to you in writing.

Dr. **Klein**. I would be delighted.

Senator **Stafford**. I would like to reserve the right to do that gentlemen with the rest of you on the panel because of our time constraints. Mr. Poirot, if Vermont sets a sulfate standard would it be possible, scientifically, to determine what reductions in SO_2 emission will be required in upwind States. Does the State expect cooperation in implementing a State sulfate standard.

Mr. **Poirot**. Would you like me to answer that now?

Senator **Stafford**. Yes; if you can. If you prefer to answer it in writing that would also be perfectly agreeable.

Mr. **Poirot**. In answer to the first question, we believe that we can determine the size of the reduction requirements in other States that will be required by the use of three different analytical techniques, none of which may be a stand alone technique. But, we are going to look at it in three different ways. One is the trajectory analysis that I showed you, one is the elemental tracer technique that I mentioned, and third is a long-range transport model that we are currently in the process of negotiating with a couple of professors at MIT to run for us. So, yes, we do believe that we will be able to come up with some suggested reduction requirements that will be necessary to obtain that sulfate standard. And, yes to the second part of that question, this will of course require cooperation from EPA.

Senator **Stafford**. Thank you, very much. Mr. McLean, have your studies or those of others provided any good data on how much reduction of SO_2 or other pollutants are needed to protect the sensitive waters here in Vermont?

Mr. **McLean**. No, Senator, they haven't.

Senator **Stafford**. I asked you about liming of some Vermont waters. I suppose that might help in a very small pond.

Mr. **McLean**. Yes; we view liming, Senator, as kind of a short-term solution. The buffering capacity will be replaced but obviously with continued deposition be consumed again and we will be right back. It's a cosmetic solution.

Senator **Stafford**. I would agree with that. That will conclude the first panel, and Mr. Lash, we are going to have another go at you later, so I will let you off now. The second panel will be on toxic air pollutants, and it will consist of Roberta R. Coffin, commissioner of health, Vermont Department of Health; Mr. George E.

Hamilton, director of Vermont Public Interest Research Group; and Mr. John R. Ponsetto of Gravel & Shea, Burlington, VT. All right, on this panel, I think it would be appropriate, Dr. Coffin, that chivalry and everything else would ask us to call on you first. Again, let me remind you that your written statements will appear in the record, and if you can summarize them in 10 minutes or less it will be appreciated and of course consistent with the mythology of Vermont and Calvin Coolidge that we speak briefly.

STATEMENT OF ROBERTA R. COFFIN, M.D., COMMISSIONER OF HEALTH, VERMONT DEPARTMENT OF HEALTH

Dr. Coffin. Thank you very much, Senator Stafford. I will try to confine my remarks to the allotted time period and hope I can highlight some of the important public health concerns about air toxics. Departments all across the Nation are involved in complex and often very controversial situations where environmental contaminants pose potential health hazards. Public health is the bottom line. Determining a proper action is hampered by a paucity of information on health effects and the lack of availability of standards for the majority of chemicals in commercial use in the United States. Yet, without a standard or quantitative action level, the public health agency has only limited justification for intervention, further study or any type of action.

In many situations the rapid formation is required of a threshold for public health activities. Developing this level for a pollutant involves employment of a series of steps which includes utilization of existing information on toxicity, carcinogenesis, mutagenesis, and so forth. The experience of other public health agencies, transmutation of related standards and a decisionmaking process. All this activity is duplicated many times by each of the State public health agencies when faced for a need of action. No State is ready to take carte blanche on other States' decisions. Many resources are utilized. There is a duplication of effort. Questionable experts and expertise is utilized, and there is no uniformity of results. All this because there is a lack of one overriding guideline, policy or standard that has been developed as the result of the best available scientific knowledge by EPA.

In 1982 the Vermont Department of Health undertook a statewide surveillance project to determine the levels of volatile organic chemicals in 50 community water supplies. As a result of this monitoring, tetrachloroethylene, trichloroethylene and 1,2-dichlorethene were found in the community water supply well in Williamstown, VT. During this investigation it was found that the only significant user of volatile organic chemicals in the community was an industrial uniform laundry and drycleaning plant located between an elementary school and a high school. The finding that this drycleaning plant had distilled fluids used in the cleaning process and disposed of the tetrachloroethylene containing sludge in holes on the hill outside the establishment overlooking both schools increased the concerns of the community. Testing further showed contamination of the town drinking water, ground water, surface water and soil.

In addition to the water contamination problem, reports and observations of tetrachloroethylene-like odors were noted in the high school next to the plant. The known odor threshold for tetrachloroethylene is 5 to 50 parts per million. Instantaneous grab samples of the air taken on the high school and elementary school property showed up to 150 parts per billion of tetrachloroethylene even when no odor was apparent. As a result of the findings of tetrachloroethylene contamination of the community water system, the private wells in the ambient air near the plant, questions arose concerning possible health hazards especially for the children in the schools. There were demands from many parents that schools be closed because of the potential risk.

After discussions of all available information, including a survey of every single other State in the Union, and extensive discussions with the multidisciplinary group of Vermont public health professionals, an interim ambient air exposure level for tetrachloroethylene for evaluating the short-term air quality in and around Williamstown schools was developed. The first such development of a standard in the country. This level was then compared to estimated average daily intake calculations from all sources, including the water, for tetrachloroethylene.

This interim standard forms the basis of the health order which I issued requiring the plant to remain closed unless they could demonstrate concentrations of tetrachloroethylene at lower concentrations at the school boundary.

This standard provided an approach for the Department of Health toward the elimination of potential health risks based on analysis of existing information. But, it did not produce consensus or remove controversy. It did, however, provide the basis for us to take State action.

Formation of this type of interim standard is useful, and it may in cases be required in dealing with environmental contaminates even on a short-term basis. I would strongly recommend that this be done at the Federal level. To this date, now, almost 2 years later, the standard remains useful in this particular town. It is, however, more appropriate that standards be developed as I have said, on a national level by all the leading experts wherever in the country. When there are individual States or locally developed standards, State borders are not sufficient to divide and make reasonable support of differing numbers or approaches to standards. This was amply demonstrated during last year's ethylene dibromide scare. Each State had a different number. EPA suggested a number, and confusion reigned because States did not agree the EPA's number was low enough or arrived at rapidly enough. This is typical for any type of standard.

It is difficult for States to answer the question which were posed to State officials such as myself, why is your number different or higher than your neighbor's number?

The costly process for each State to do the scientific calculations necessary to develop individual State standards for air pollutants is hard to justify.

Environmental standards are not always those which are agreed upon by a State's health department unless there is a cooperative working relationship such as the one we have here in Vermont.

The risk assessment for small populations is not justifiable scientifically when we are talking about low level environmental exposures to many contaminants. In order to provide a great enough power in scientific calculation, a large denominator, especially to develop the carcinogenic risks, must be used which would encompass many more people than in one State, especially one the size of Vermont.

The Vermont Health Department had the unique opportunity to investigate the health effects of indoor contamination which is another area of air toxics which should be addressed at the same Federal scientific level. This is the situation which has been widely discussed about Poultney where thermometer plant workers carried mercury home from the plant on their clothes.

The vaporization of mercury took place, and increased air levels were established in the homes to be inhaled further by the workers and their children. Result was that excessive mercury levels were detected in 18 out of 23 children tested.

Scientific knowledge will continue to advance. It is never static. Approximate standards and guidelines are all right. And, they can be based, as you have said, Senator Stafford with the evidence that is agreed upon beyond a reasonable doubt levels with reference to the acid deposition. The process which we have begun here in Vermont with the Agency of Environmental Conservation to develop air toxic regulations and guidelines is a noteworthy one. The proposed standards are surely to be hotly debated as are all health effects standards proposed to prevent health effects of toxic emissions. The public has become increasingly sensitive to particular toxic effects on the sick, young, and old as well as the healthy worker. And, yet the only basis that we have now for standards are OSHA workplace standards. Greater knowledge of current levels of toxic air emissions under all types of atmospheric conditions will help form a basis for standard setting. However, careful gathering of health effects data, including cancer and birth defects registries, are important if we are to know the actual bottom line effect of air and other pollutions on human beings. I appreciate the opportunity to present some of the problems which the Vermont department is faced with with respect to especially air toxics in Vermont. Thank you very much, Senator Stafford.

Senator STAFFORD. Thank you very much, Dr. Coffin. I'll just comment at this point 2 weeks from today our committee will be holding some hearings with respect to interior air toxic problems in Maine under the leadership of Senator George Mitchell of that State who is a very valuable member of our committee. Next we will be glad, Mr. Hamilton, to hear from you.

STATEMENT OF GEORGE HAMILTON, DIRECTOR, VERMONT PUBLIC INTEREST RESEARCH GROUP

Mr. HAMILTON. Good morning, Senator. I'm George Hamilton, executive director of the Vermont Public Interest Research Group. For the record VPIRG is a citizen organization with over 2,200 Vermonters as members. We have been active in the State on environmental consumer protection issues for almost 15 years. VPIRG is also a member of the Vermont Clean Air Coalition.

I would like to thank you, Senator, for the opportunity to testify on such an important subject as this. For the emission of toxic material into our air represents perhaps the most insidious form of exposure. Sitting here in the Green Mountains it is hard to imagine that the air we breathe may be contaminated by cancer causing agents. In fact, compared to many other States we are very lucky in Vermont. But, this good fortune should not be taken for granted. It must be supplemented by constant efforts to adopt policies that prevent the spread of contamination. Shocked by events in Williamstown and Poultney, the State has quickly come to realize that the threat posed by toxic chemicals is not limited to States like New Jersey, but in fact has begun to crack the pristine stronghold of northern New England.

Responding to a history of inaction by the U.S. Environmental Protection Agency and increase in health threatening pollutants on the local level, many States have initiated programs to fill the void. Vermont is in the process of adopting regulations that would establish ambient air standards for toxic contaminants as well as a permit procedure that encourages the installation of best available pollution control technology. While these regulations are badly needed to protect Vermonters, they require significant resources to evaluate the chemicals and to ensure compliance. For a rural State like Vermont that continues to reel from dramatic Federal budget cuts, raising enough funds to provide adequate protection is no small task. Vermont would not have acted if EPA was doing its job.

Yet, under pressure from Congress EPA has chosen not to activate its long dormant Air Toxics Program. Instead it recently suggested that its responsibility for setting chemical health standards should be formally shifted to the States. The agency has proposed providing a air toxics clearinghouse and setting aside $3 million to help States expand their data base to establish their own health standards.

While local control is attractive to a State like Vermont, in this case it is impractical. In fact, EPA's plan to shift responsibility for setting standards to the State is not only impractical but it is also inefficient, unfair and contrary to the original intent of the Clean Air Act.

It is inefficient because it will require 50 separate scientific evaluations instead of one. It will also require 50 proceedings to review the standards, 50 teams of bureaucrats to write them, and 50 separate decisions. All of this seems 50 times less efficient than requiring EPA to fulfill its mandate, save some money and set the standards itself.

There are some other reasons why it is not a good idea to leave it up to the States to implement the standards. For one, it is simply unfair to put States in the position of having to choose jobs over environmental protection. Wide disparities in standards already exist and could lead large industries to shop around for States with the lowest standards when siting a major facility.

The Allied Corp., for example, is required by State regulations to keep its releases of ammonia below 24.1 tons a year for its plant on the Delaware-Pennsylvania border, but only below 332 tons a year or almost 14 times the pollution for its plant in Syracuse, NY.

Strong uniform standards would enable areas like Vermont to compete fairly for jobs without sacrificing environmental safeguards.

The final reason that we believe that EPA should retain and act on its authority to set ambient standards is most dramatically illustrated by acid rain. No matter how tough our State sets its standards, weaker policies in other jurisdictions could threaten Vermonters. Air pollutants do not respect political boundaries.

All of this is not to say that States should be precluded from setting stricter standards. In fact, we urge the committee to adopt specific language that gives States the authority to establish their own policies or standards as long as those are deemed to be stronger protections for the public.

In addition to shifting the standard setting responsibility to the States, EPA has proposed the following for its air toxic program. One, to expand its priorities beyond industry to include other pollution sources such as road vehicles, heating sources, et cetera.

While this proposal is noble and long overdue, it is hard to believe that the agency will seriously carry out this expansion without congressional prodding and oversight. In the 15 years since the Clean Air Act EPA has only set standards for six of the several thousand chemicals emitted by industry every year. We believe it is time for Congress to step in, set criteria and a time line and force EPA to act, both on its new and old priorities.

Second, EPA has vowed to support efforts to pass community right to know policies.

We clearly agree with EPA that people must have access to information on the hazardous chemicals used in their community and are proud of the fact that Vermont was one of the first States to have a community right to know law.

Third, EPA has proposed to foster better coordination between Federal and State emergency teams.

Given the experience of the Bhopal tragedy, there is no question that strong measure must be taken to prevent such events from recurring. Steps must be made to better coordinate and to shore up our emergency response procedures.

In general, we believe that Congress should take the following actions with respect to EPA's proposal.

One, reject EPA's plan to abdicate its standard setting responsibility for air toxics.

Two, force EPA to act quickly on setting standards for priority pollutants.

Three, specifically give States the authority to set standards or to assume the permit program and enforcement responsibilities if States can demonstrate that their actions would result in better protection for the public.

Four, allow EPA to expand its focus to include road vehicles and heating sources on the condition that the Agency adheres to a strict timeline for action and that it does not forsake other priorities.

VPIRG has recently had the opportunity to review H.R. 2576 which was introduced by Representatives Timothy Wirth, Henry Waxman and James Florio. They call it the Toxic Release Control Act of 1985.

We believe that the provisions of H.R. 2576 would shore up the EPA program and put it on a more productive course. The bill would require EPA to set strong national health standards as well as conduct a long overdue national inventory on toxic emissions. Among many other positive aspects, H.R. 2576 would also establish a tough permit program that ensures public involvement.

VPIRG supports the substance of H.R. 2576 and urges your committee to adopt similar provisions. Thank you, Senator, for the opportunity to comment and for your continued good work on behalf of the national environment

Senator STAFFORD. Thank you, Mr. Hamilton, for your very good statement. I'll just comment at this point that it's long been the philosophy of this Senator and has been written into most of the environmental laws since I've been on the committee, that when we adopt Federal legislation, it usually provides that standards can be treated as a national floor and that States may enact stricter provisions if they wish to. This is consistent with your own theory.

You might be interested to know that in our current proposal for extending the Superfund Program we do have a requirement for a national inventory, and that's now been agreed to by three Senate committees. If we can bring it to the floor and pass it we'll be in pretty good shape.

Finally, I have to comment that H.R. 2576, if memory serve me, may very well be a good bill, but it's principal difficulty is that Henry Waxman, who is the chairman of the subcommittee, is opposed to it which makes it very difficult to get out of subcommittee or full committee and to the House of Representatives. Those are just comments by way of passing. Mr. Ponsetto we would be glad to hear from you.

STATEMENT OF JOHN R. PONSETTO, ASSOCIATED INDUSTRIES OF VERMONT

Mr. PONSETTO. Thank you very much, Senator, and good morning.

I am John Ponsetto, and on behalf of the Associated Industries of Vermont I would like to thank you for this opportunity to testify before the committee on the important topic of the regulation of hazardous air pollutants. As a former commissioner of the Vermont Department of Water Resources, I am familiar with the difficulties surrounding this complex program.

AIV has over 600 members whose employees make up 70 percent of the Vermont manufacturing work force. AIV's membership is concerned about the environment of Vermont and about the health of Vermonters. AIV's members are also concerned about the impact of Government regulation on their ability to do business and provide jobs and products in Vermont. The toxic air regulations proposed by the Vermont Department of Water Resources will effect one-half of AIV's membership. A recent survey of 25 companies representing a cross section of Vermont's industries indicates that the cost of complying with standards contained in a recent draft of the regulation is estimated to be approximately $6 million for industries which responded to the survey.

For many years the association has played an active, and we believe positive, role in helping to establish a system of environmental and health protection laws in Vermont that makes sense for Vermont. We recognize that the regulatory authorities must ultimately make the final judgment on the content of regulations.

For instance, for it's part in the ongoing process here in Vermont of adopting toxic air regulations, the association has made available to State officials a highly qualified, nationally known toxicologist for advise and consultation. As I said, any law to be effective and fair must be rational as well as workable. To be rational the law must be based on a sound scientific foundation. The standard of conduct it imposes must be that which is reasonably needed to achieve the desired result.

The regulations should not overburden the regulated community with requirements, treatment, monitoring, and paperwork which in no real way contribute to the protection of the public health and the environment. The law must also be workable, and the regulatory program that works best is one run by that body of government closest to the people and able to do the job.

For the past several months AIV has been working with the Departments of Water Resources and Health in the drafting of regulations to control the emissions of toxic air pollutants. Our experience has taught us some lessons which you might find useful.

We agree that there is a need for a program to control the emissions of toxic air pollutants. There also appears to be adequate legal authority to draw up such a program both at the Federal and State level under the provisions of section 112 of the Federal Air Act and the Vermont Air Pollution Control Act.

The regulations will require many Vermont industries to become more knowledgeable about the chemicals they use and to develop a better understanding of the nature and quantity of the chemicals in the work place.

The problems associated with the regulations are extremely complex. Vermont, like most States, does not have the personal or resources to assess the effect of the thousands of chemicals being used today on humans and the environment and to determine what concentrations are safe. The chance of adopting a rational regulation under these circumstances is difficult. We risk under or over reacting and neither citizen nor regulated community are well served under these circumstances.

The regulation of hazardous air pollutants should be modeled after the other Federal and State environmental programs of national significance. The Federal law should establish the overriding national goals of the program. The Federal Government should set minimum standards and do the scientific research necessary to establish those standards. The Federal Government should also provide the States with financial and technical assistance needed to administer the program.

The States with Federal oversight should carry on the day to day functions of permit issuance, monitoring and enforcement that are required to make the program work. The States should be given maximum flexibility to adopt a program which is tailored to fit the way things are best done in the State. The standard for Federal approval of a State administered program should be consistency and result rather than method.

Of all the roles mentioned above, probably the most important contribution that the Federal Government can make to the State's effort to control air toxics is to provide the research needed to establish standards. We need assurance that the conversion of the occupational health standard to an ambient standard and approach adopted by Vermont and other States make sense.

We need to know whether for any particular chemical a safety factor of 10 or 100 or 1,000 is appropriate. In order to avoid a regulatory system which demands highly expensive treatment systems to compensate for the lack of information, we need high levels of understanding about the short- and long-term impact of chemicals on human health. Section 112 of the Federal Clean Air Act requires the Administrator of EPA to establish emission standards for hazardous air pollutants. If the Administrator would carry out this mandate, it would avoid the costly and duplicated efforts of 50 States trying to do the same thing.

Vermont industry has an excellent record of compliance with State and Federal environmental laws, and it will comply with the regulations on toxic air pollutants. Our plea is that the regulations be based on the best available scientific information, make sense in terms of the Vermont situation, and be run out of Montpelier, not Washington or Boston. Thank you very much.

Senator STAFFORD. Thank you very much, Mr. Ponsetto. For this panel I would make the same request that I did the last one. That is if you are willing, we would possibly submit some questions in writing to you for response at your early convenience to the committee, and I do have one or two that I will ask here personally.

Before I do that, we do have one more panel and one more witness scheduled. It would be the Chair's intention, unless there is serious disagreement from the panelists and from Dr. Allen, to recess the committee at the conclusion of this panel for about 45 minutes in order to allow people who wish to a bite to eat, including the chairman of this committee. If that will seriously disaccommodate the people scheduled, we will change our plans. I'm giving you advance notice of our intentions so you can think it over while we are asking this panel a couple of questions.

Dr. Coffin, while the Federal Government has, obviously, vastly more resources to devote to research on toxic pollutants than Vermont has, some of the knotty scientific questions involved in determining safe levels of pollutants plague Federal researchers and regulators as well as they do State officials. Could you offer any insights from your medical background and current experience to suggest how public policymakers should address the public's demand for safe levels of pollutants given scientific uncertainties.

Dr. COFFIN. I think this is the difficult question that we do face. With changing scientific knowledge with different approaches to the calculation and use of currently available scientific data, an absolute number is very difficult to arrive at for all time hereafter. Therefore, I think that it's important that we all realize that this is a number which can undergo change, modification, or revision as scientific knowledge and approaches to data interpretation and evaluation take place.

We certainly never intended to be the forefront in developing the kind of numbers that we already have, and yet they do provide the base for action. We do have to take action. We do need the guidelines. I think that there is no problem with reasonable people saying this is a reasonable approach which we can then modify.

Senator STAFFORD. Thank you very much, Doctor. Would any panel member be willing to comment on the idea that the amount of control required of a particular plant should be based in part on how many people live near the plant?

Dr. COFFIN. Well, I think everybody is looking at me. I think we've already said something about that. The Governor has already made the kind of statement that a scientific basis should be uniform regardless of who lives nearby and the numbers of people that live nearby.

Senator STAFFORD. That makes me think of the question of tall stacks versus low stacks and the fact that in the air problems the tall stacks that came in in the 1950's and early 1960's together with a 270-percent increase in the burning of high sulfur fossil fuels in the 31 Eastern United States had a lot to do with the acid rain problems we are facing today. Maybe if those tall stacks had not been built the States that we believe are originating our problems would be dumping purely on themselves instead of on us here in the Eastern United States and Canada.

Dr. COFFIN. Might make a difference.

Senator STAFFORD. If we went back to small stacks it might hasten their understanding of the problems they are causing. However, that's neither here nor there on this.

Might I ask any panel member who cares to comment, there are several proposals for amending the Clean Air Act that call for the application of the very best technology on all major sources of hazardous air pollution. The theory is to reduce toxic air pollutants to the maximum extent possible and if scientific evidence shows that remaining levels of some pollutants are still harmful to require further reductions or their eliminations. Would any member of the panel to comment on this approach to hazardous air pollutants?

Mr. PONSETTO. The Associated Industries of Vermont has considered that question, and basically it's our position that treatment should be required to the level necessary in order to reach a safe emission level. We believe that in many instances there is sufficient scientific information available to indicate that there are safe levels for certain types of chemicals. And in no circumstances we see treatment for treatment sake, at least in particular for many of Vermont's small industries as being nonproductive.

Senator STAFFORD. Thank you, Mr. Ponsetto. Any other comment from any other member? Mr. Hamilton.

Mr. HAMILTON. We tend to support that approach in a sense that many scientists believe that very small quantities of certain chemicals can cause serious harm that a goal of reducing to zero certainly is within reason and is certainly worth supporting.

Dr. COFFIN. Certain States have used this, as you are well aware, of course, Senator Stafford, and that certainly is in the examination of standard and evaluation of what one should propose for a national standard is a piece of the pie.

Senator STAFFORD. Thank you. One final question for the panel. Section 112 of the current Clean Air Act focuses on controlling emissions from major sources of hazardous pollutants. A recent EPA study suggests that substantial quantities of toxic chemicals are emitted by smaller sources such as dry-cleaning establishments and service stations. Would any member of the panel offer any suggestions about how these sources might be best controlled and what the relative roles of State and Federal Government should be in this particular incidence?

If any of you would prefer to answer this in writing rather than here that is agreeable to the committee. I see Mr. Hamilton, nodding his head. We will take an answer in writing from Mr. Hamilton, then. Either you, Dr. Coffin, or Mr. Ponsetto, if you wish.

Mr. PONSETTO. I think that it would be very difficult for a State the size of Vermont to ignore, based on its recent experience in Williamstown, sources such as drycleaning establishments and other smaller industries. I think the role of the Federal Government, again, is in the development of the standard. A tremendous amount of work went into developing the standard that the Health Department issued in the Williamstown situation. Extremely difficult to duplicate that time and time again as we faced it in different situations. But, I see the role of the Federal Government as establishing standards and doing the research and the Department of Water Resources and Department of Health administering the program is appropriate depending on the size of the facilities that we have.

Dr. COFFIN. Once again, the situation is that a standard is a standard. People should not be exposed to greater than the standard.

Senator STAFFORD. Well, thank you very much all three. The members of the committee who aren't here will appreciate your testimony. And, for them I regret, I am sure, the fact that they aren't here. They are back in Washington in a 95 degree day with high humidity. The ground water panel for this afternoon, Mr. Lash, Mr. Palola, Mr. Spangler, and finally Dr. Sinclair Allen, is there objection from any of those named, assuming they are here, to adjourning now until say 10 minutes of 1 and continuing at that time? There being no visible or audible objection we will recess the committee until 10 minutes of 1.

[Recess taken.]

Senator STAFFORD. The committee will come to order and we'll resume the hearing that we began this morning on acid deposition, hazardous air pollutants, and ground water contamination. This afternoon the panel that we're about to hear will be on the subject of ground water and will consist of Mr. Jonathan Lash, commissioner, Department of Water Resources and Environmental Engineering, Vermont Agency of Environmental Conservation, who will be making his second appearance before the committee. He's accompanied by David Butterfield, chief, groundwater management section, water quality division. Mr. Eric Palola, associate director, Vermont Natural Resources Council, Montpelier, VT. Mr. Car Spangler, vice president of planning, Killington Ltd., Killington, VT. Gentlemen, if it's agreeable with you we'll start with Mr. Lash then Mr. Palola and then Mr. Spangler in the order in which we have called them. Mr. Lash, will Mr. Butterfield be making any statement or is he here as a resource?

Mr. LASH. I will just make a brief policy statement and then I'll ask Dave to talk about the practical implications of our new legislation.

Senator STAFFORD. All right. That will be fine. All right, then we'll start with you, Mr. Lash.

STATEMENT OF JONATHAN LASH, COMMISSIONER, DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING, VERMONT AGENCY OF ENVIRONMENTAL CONSERVATION

Mr. LASH. Thank you, Senator. I'm pleased to be back. If I might I'd like to take a few moments to go back to a subject covered in the earlier panel on toxic air pollutants, because we do have regulations pending. It's been some months since I've been able to indulge in my old passtime of EPA bashing and I wanted to get back to it for a few moments.

I would say first, I have found working with region I EPA with Mike Deland and Paul Kehoe an absolute pleasure. I don't know how other regions work with the States in their area, but that one is very responsive and goes out of their way to be helpful to Vermont. However, on the subject of toxic air pollutants they have little they can do and we find ourselves deeply frustrated.

Congress adopted a system 15 years ago, in section 112, requiring EPA to deal with toxic air pollutants and to set standards that provided an adequate margin of safety. Despite requests in 1977 and again over the last several years Congress has never drawn back from that standard. Yet, as several witnesses pointed out this morning, EPA has made little progress.

In recent years, the debate has bogged down, not in a debate over whether the toxics that are released into the atmosphere cause adverse health effects, that seems to be agreed, but whether the cost of regulating them is worth the reduction of the risk. The most recent episode over asbestos descended to the rather obscene level of determining the discount rate that should be applied to a life saved in the future. Whenever I describe it to a Vermont audience it makes their jaws drop in total astonishment, they can't believe it's really happening in Washington and I assure them it is.

The new EPA policy, which tells us that we have to take responsibility for regulating toxic air pollutants, except for woods stoves, the one thing that we would like to have responsibility for dealing with, leaves us in a position of having to make decisions and not having the technical resources to be able to make them. EPA, after all, retreated from this question because they felt the questions were too hard. Despite a research budget that is in the hundreds of millions.

We, having set toxic air pollutant standards have grabbed for the best thing available as have many States. We've looked to the OSHA standards. OSHA standards which were designed years ago may not be the best in terms of present day technical knowledge and are certainly not appropriate for ambient air quality levels. We're taking those standards, applying a safety factor and a factor designed to convert from workplace exposure to 24-hour, 7-day-a-week exposure, and simply converting them into ambient standards. This is using the bluntest of all possible instruments for something that should be done with surgical care.

It also means that we are making these standards without the services of any toxicologist. There is one toxicologist in State government, he works for Dr. Coffin and is assigned to very different tasks. It will mean that there are 50 different State standards. There are already a proliferation of standards in Vermont and any rational industry decisionmaker will base his locational decisions in part on those standards. We are simply not a big enough market to tell IBM we're going to impose these standards and it's tough on you if you want to leave.

The question that you addressed to the panel illustrates perfectly the problem, what to do about gas stations. California has already proposed pump based controls for emissions at filling stations. Those are extremely expensive for the filling stations. EPA was considering on board controls that would have been quite cheap if installed on the entire automobile fleet. What is Vermont to do? We really cannot do either. We're too small a market to require pump base controls, we cannot influence Detroit so we will do nothing. It's nonsense factory solution.

I'm sorry for departing from the agenda, but it's a problem that is pressing in on me daily. Let me very briefly talk about some of the policy issues presented by ground water and then leave it to Mr. Butterfield to talk about specifics and to Mr. Spangler and Mr. Palola.

We are blessed with ample ground water resources. There are, we calculate, some 60,000 wells and springs in the State. We are almost unique in how near ground water is to the surface and how quickly it interacts with surface water in our area. Over half of our population depends on ground water resources for drinking water supplies. Nevertheless, the State, until recently, had not paid much attention to ground water issues, perhaps because it was plentiful, perhaps because we thought of it as an almost undamageable resource.

Mr. Becker, another member of my staff, told me that a decade ago there was only one geohydrologist in State government, now I believe he told me there are 10. We're beginning to wake up.

The past session of the legislature reflected the sudden increase and concern with ground water resources. The legislature passed five separate bills that deal with ground water. The first and the one we'll discuss most today was S. 11, which is a regulatory bill. They also passed underground storage tank legislation designed to protect ground water. A mini superfund bill designed to deal with toxic wastes and ground water pollution. A private right of action with respect to ground water. Finally, a pesticide monitoring bill designed to determine the extent to which pesticides create risks to ground water.

The bill, S. 11, that is most important to us at this point, is designed not as a permitting bill but as a risk regulation bill. Our effort is to regulate those activities which could pose a risk of contamination to ground water quality. That risk regulation approach is different from our approach to surface water, where we try to control water quality itself. Partly because ground water conditions are difficult to monitor, partly because it takes so long to clean up ground water if you've contaminated it, in some cases it's virtually impossible to do so.

The legislature instructed us to take all of the ground water resources in the State and to classify them in one of four classes ranging from class I designed to protect aquifers serving as significant public water supplies to class IV in which there are already significant risks and we are willing to accept further risks. There are over 300 landfills in the State, scores of sewage treatment plants, industrial facilities, storage areas that could pose risks to ground water. We deal with some 200 or more spills, 50 leaking underground storage tanks a year. We're investigating more than 40 sites we believe may be contaminated by petroleum or toxic waste.

Our policy in the future will be a preventive policy. We will try to locate those activities that could create risks in the area in which those risks are most acceptable. We will do that, not through a new permitting program, but through the use of our ground water classifications in our existing permitting program. As I think you will be able to gather from Mr. Butterfield's presentation, we do not believe that that program will involve significant constraints for ongoing development or industrial activities in Vermont. But rather they will provide a tool to enable us to plan where we locate activities so we won't have problems in a decade. I would leave the rest to Dave Butterfield and Larry Becker.

STATEMENT OF DAVID BUTTERFIELD, CHIEF, GROUND WATER MANAGEMENT SECTION, WATER QUALITY DIVISION

Mr. BUTTERFIELD. Thank you, Senator for this opportunity. I got a phone call message from Larry Becker last night that we were having a meeting this morning of some kind. When I called him at 9 o'clock I found out what this was about. So, my testimony this afternoon will be a little erratic. I did bring with me, though, some documents and some publications which I think will be useful.

Senator STAFFORD. Since they look fairly voluminous, I think that the committee might make them part of the record by reference rather than actually having them printed.[1]

Mr. BUTTERFIELD. Senate bill 11, as we know it here in Vermont, did give us a wide range of capabilities, some of which we have already been doing. It enumerated a number of the programs which we had been carrying on up to this time. But the major addition was the four new classes of ground water, which enable us to have a well rounded program. Presently, in Vermont we monitor ground water levels at the end of each month in some 15 to 20 observation wells. These records have been going on since 1965 and, in reference to earlier testimony this morning, I can tell you that Vermont is not in a drought condition over these past 20 years.

The Department also licenses water well drillers. From these drillers we collect and file records of the wells that have been drilled and this enables us to have a very substantial body of ground water data on which to plan and to administer programs. We collect data on contamination incidences which come to us from the Health Department and from the Agency of Transportation.

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[1] The documents referred to are: "An Ounce of Prevention, A Ground Water Protection Handbook for Local Officials;" "What's Going On Down There? Vermont's Ground Water;" "Vermont Aquifer Protection Area Reference Document;" and an excerpt from the U.S. Geological Survey Water Supply Paper 2275. These documents have been retained in committee files.

Vermont's problems are significantly different than in other States. We have a lot of problems with road salt and dairy and drinking water wells. We have nitrate levels from agricultural and domestic onsite disposal. Volatile organic compounds, as was mentioned this morning at Williamstown and elsewhere, rate on the naturally occurring gaseous radioactive form that is also found in some of our ground water.

The Department responds to inquiries from the public and we develop, through special studies regarding ground water contamination, strategies and other planning work to assist the department in protecting ground water. We assist the Department in developing and enforcing rules and regulations.

In 1982, the Department developed a strategy that focused on protecting community water supply systems. Under this program we put together a program to map what we call aquifer protection areas around our existing community water supply systems. In a few moments I'm going to ask Mr. Becker to show you an example of what an aquifer protection area looks like.

Under Senate bill 11, we will be revising that strategy of 1982 putting into it the four classes of ground water and developing rules and regulations to implement those four classes which will include standards and criteria for adopting those four classes. We will convert our aquifer protection area mapping to reflect class I and class II ground water areas. Then eventually, we will get on to map and designate class IV areas where the ground water does not need to meet drinking water standards. I should tell you a bit more about what class I, II, III, and IV are.

Class I are those ground waters which serve public water supply systems where there has been no designated or identified risk to the water. We are looking at essentially pristine, hillside spring type situations where we have not identified any risk to the ground water. Class II are those ground waters which also supply public water systems, but where there has been some risk identified. There is a roadway, there are buildings, there are, perhaps, commercial or industrial applications that could pose a risk to the ground water.

S. 11 talks about a class IV area in which the ground water does not need to meet drinking water standards. Just which criteria we will use to identify class IV areas has yet to be decided. The rest of the State is all class III, and in class III the standard will be to maintain this water as drinking water sources, but for individual homes and not communities. At this time I will ask Mr. Becker to give you a little bit of background about aquifer protection areas and I'll hold up the chart for him, our atlas as we call it.

STATEMENT OF LARRY BECKER, GROUND WATER PLANNER, WATER QUALITY DIVISION, VERMONT AGENCY OF ENVIRONMENTAL CONSERVATION

Mr. Becker. Thank you, Senator for the opportunity to speak about this.

As part of the ground water strategy that Mr. Butterfield mentioned, we had a series of public meetings and it was agreed at that time that we would use existing information to outline these aquifer protection areas which are essentially the recharge areas to community ground water supplies.

We did a prototype study around municipal supplies serving towns, villages, hamlets, and fire districts. We used existing information like bedrock geological information, surficial geological information, soil maps, topographic maps, and air photos. Every time a well is drilled in the State the driller must report it. Hopefully, there would be an engineering report done, a pump test done on a well.

So, our geology is complex, we looked at each site in a site specific manner, but they tended to fall into eight general categories, sand and gravel wells, bedrock wells, and springs. As an example, we thought we might show some in the Rutland area. This is a well for the Center Rutland Fire District and for the West Rutland Fire District. After we map these areas we get a land use survey to see what kinds of activities were going on in the area so we could get an idea of what kind of potential conflicts might exist between land use and water supply. For the Center Rutland system the area is in total size 202 acres. There is about 20 houses inside that are on sewer lines. 80 percent of the land is forested. Point 4 mile of road go through the area and 0.8 miles of power line go through the area.

Senator Stafford. That's Center Rutland you say?

Mr. Becker. Yes. Center Rutland. The West Rutland area was 37 acres in size, 26 houses that are sewered, 10 percent forested, the rest is open land and about half a mile of road that goes through the area. We did this land use survey, for the whole state, looked at all the areas.

About four-tenths of 1 percent of the land area of the State is taken up with these aquifer protection areas and municipal supplies. We did the range of land use activities within those areas. We have sent these areas to towns to use as technical advisory information and for planning and zoning. The State permitting agencies that permit various activities use them as guidelines and deciding activities. As Mr. Butterfield mentioned our next charge is to refine this information into the classification system that's outlined in our new law. These are probably above the class II areas because there visually is some risk involved in those areas.

Senator Stafford. Did I understand you to define a class III area as still drinkable water?

Mr. Butterfield. S. 11 seems to indicate that the use of class III is to be for drinking water supply, but not community or public system.

Senator STAFFORD. Did I understand you correctly that the class III drinking water could be supplied at an individual house but not a community system or did I misunderstand?

Mr. BUTTERFIELD. That's a differentiation between class I and II and class III. The class I and class II areas are specifically for public water supply systems serving 10 or more connections and that class III area is all the rest of the State except for class IV areas.

Senator STAFFORD. I see, OK.

Mr. BUTTERFIELD. The class III areas, the landowner would still expect to be able to drill a well and get potable water for his individual needs or farm use.

Senator STAFFORD. All right, thank you.

Mr. LASH. It's important to remember that the classifications don't reflect water quality. We're not saying that it would allow the individual homeowners to drink worse water than a public water supply system. The water quality standards for drinking water remain, but we would accept higher risks in the class III area, because if you only have individual systems the cost of replacing them, if they become contaminated is more manageable. So, what we're trying to regulate is potential risks.

Senator STAFFORD. Thank you very much. Now, Mr. Palola, we would be very glad to hear from you.

Mr. PALOLA. Thank you, Mr. Chairman.

STATEMENT OF ERIC PALOLA, ASSOCIATE DIRECTOR, VERMONT NATURAL RESOURCES COUNCIL

Mr. PALOLA. Welcome back to Montpelier and thank you for this opportunity to talk about ground water issues. My name is Eric Palola and I am the associate director of the Vermont Natural Resources Council. VNRC is a statewide conservation organization dedicated to the wise use of Vermont's natural resources. If the council were to rate any of the various natural resources that Vermonters are privileged to the State's ground water would be at or very near the top of the list.

I would like to comment on three areas regarding the council's experience with ground water issues in Vermont, beginning with factors that contributed to the passage of our recent ground water legislation; second, some of the concepts behind one of the bills; and finally, some thoughts for ground water legislation at the Federal level.

First, as you probably know, three significant ground water bills passed the Vermont Legislature this year, specifically; a bill to regulate underground storage tanks, another bill that modernized Vermont's ground water law, and also, a bill that codified a ground water management policy.

Collectively these bills allowed Vermont to both catch-up and forge ahead in the area of ground water protection. Faced with some 8,000 underground tanks Statewide, and a ground water law that dated back to the 1860's, it was imperative that we update our monitoring and enforcement of tanks as well as remove the right to pump and pollute an unlimited amount of ground water without liability. These were the "catch-up" bills and they will be essential in both preventing and responding to future ground water contamination. Yet these bills are given added weight by the newly adopted management program which allows the State to take a more prospective approach to ground water use and protection. I will direct my remarks primarily toward the concepts in this bill.

In essence, the ground water management bill is based on the firm policy statement that clean water is necessary to Vermont and that those places where clean water occurs will not be compromised. The bill was the capstone to an administrative process begun as early as 1973 when the Vermont Legislature first determined that "ground water resources shall be protected, regulated and, where necessary, controlled * * *" That process evolved into the Ground Water Protection Strategy which highlighted aquifer protection areas for municipal water supply protection.

Yet, running parallel to this process was an increasing realization of our dependency on ground water from a diverse group of people outside the conservation community. The 1985 Vermont Legislature was able to capitalize on an ongoing program and harness a wide range of interests that were previously discordant and difuse.

In reporting the ground water management bill to the Senate floor this year, Committee Chairman Arthur Gibb emphasized: "We should be grateful for the ground water we have, but we should not be complacent about it".

It was this sense of immediacy to protect ground water from increasingly competitive uses that helped spur passage of the legislation. The demands on water for household supply—from both existing and new development, from agriculture and industry, and from more diverse needs such as snowmaking, fisheries, and waste disposal have stepped up the focus on water resources.

Two things characterized the ability of the 1985 Vermont Legislature to prioritize ground water. There was what I call—to borrow a term from agricultural economics—an essential "critical mass" in the legislature this year. That is; there were enough people who had ground water high on their agendas so that the the legwork became primarily mechanical. Second, with the understanding that every Vermonter has a stake in clean ground water, everyone genuinely listened to each other.

Vermont is a community and we have recognized our responsibility to protect this resource. Farmers are willing to be held responsible as long as their liability is measured against accepted farming practices. Developers know the costs of locating clean, reliable sources of ground water. Environmentalists know the value of ground water as a fundamental component of natural systems and ecological stability. To summarize, our ability to gain adequate protection for our ground water came not only from political transitions but a much larger consensus. And the consensus was borne out of common need rather than a group of special interests.

Frequently, our environmental laws have failed to coordinate the effect of land use activities on our natural resources. We have relied, more defensively, on standards that are often not stringent enough, sometimes arbitrary, and in many cases disputable. We have avoided making decisions about certain activities that, by their very existence, pose risks to ground water and should, therefore, be steered away from high quality ground water areas—since the resource has an economic, social, and environmental value above any singular land use activity. It has become increasingly apparent to VNRC that criteria and standards do not necessarily guarantee the availability of clean ground water and it is why we think that a positive statement of what you want and what the risks are to attaining that goal is a better platform than listing what it is you want to prevent.

Vermont's new ground water management strategy has made a clear decision about the value of clean water to Vermonters. The bill is a significant departure from the conventional measurements of water quality and tolerable pollution levels. The bill emphasizes uses of ground water as they are valued rather than uses based on meeting certain standards. Through a classification system, a breakdown is given on what risks are associated with the use of ground water. We now have a policy that class 1 ground waters, those used for public drinking supply, will not be threatened by adverse land-use activities.

And although the concept of minimizing risks to a resource is new in Vermont it must be stressed that it grew out of a very logical process that began with a statement early on by the Legislature of the importance of ground water. This was followed by the identification of sensitive ground water areas and the encouragement that small communities, with assistance from the State, could protect their water supplies. Unfortunately, very few Vermont towns have been able to exercise control over their ground water resources and it was apparent that a strong umbrella policy was needed at the State level. The management bill, however, does not supercede local input. A conscious decision was made to have class 1 areas designated by the Legislature and that public hearings for the classification of ground waters in class 1, 2, and 4 would be held at the local level. Class 3 is the background designation of all other ground waters.

Interestingly, it was debate over the revision of the State's Water Quality Standards last summer that gave the Legislature an even clearer mandate for addressing ground water protection. Several attempts were made, particularly by VNRC, to get ground water incorporated into the Water Quality Standards. We belabored the fact that surface waters, from a regulatory standpoint, should not be separated from ground waters since we all know that water whether above or below ground is part of the same hydrological system. The Water Resources Board, however, determined that ground water was not within the statutory purview of the Water Quality Standards.

In hindsight, it would have been difficult to get ground water into the classification system of the Water Quality Standards since that system is based on objectives of surface water quality. The problem, again, is in using parameters that create certain limits rather than determining what risks are compatible with the desired uses of water resources. Having the door closed by the Water Resources Board was ultimately helpful in building momentum for acceptance of the ground water management program.

It is on the theme of inseparability of ground and surface waters that I would like to conclude. The difficulty in getting ground waters involved in the State Water Quality Standards points to what VNRC sees as a shortcoming of the Clean Water Act. As you know the State Standards are required through the Federal Act. VNRC would submit, respectfully, that the Clean Water Act should not be limited to the Clean "Surface-Water" Act. There are several places in the current act that, with little change, could definitively set out a protection policy for all waters of the United States.

Indeed, there are several places already within the Clean Water Act that enjoin ground water. These are noted in the definition of "navigable waters" which is understood to mean all waters of the United States. In addition, section 102 (a) specifically uses the term ground waters in consideration of any pollution abatement programs developed by EPA.

Can the Federal Government be involved in ground water management? VNRC's answer is "yes," with the acknowledgment that ground and surface waters are interconnected and that jurisdiction is already vested in the Clean Water Act, under the sections mentioned and in section 104. VNRC feels that a concise policy, similar to that outlined in our state ground water management bill should be incorporated into the Federal Act.

Should the Federal Government be involved in ground water management? VNRC's answer is again "yes" with the understanding that many States do not have adequate laws and programs to protect their ground waters and that the benefit of a national policy would provide a useful backdrop for maintaining clean water in the future, particularly in areas where major aquifers bisect State boundaries. We're not talking abut a substantial new commitment of regulation or Federal resources. The statutory framework is already in place.

There are now, as you know, tremendous pressures on our ground water resources Nationwide. We, in Vermont, are fortunate to have a relatively bountiful supply yet we do not take the resource for granted. It is the Council's hope that your committee will find our state programs and our citizen concern helpful in your discussion of ground water legislation.

Some specific recommendations by VNRC are:

One, consideration of ground water management as an active and integral part of the Federal Clean Water Act. Funds for comprehensive mapping and monitoring of ground water supplies should be available through section 104. Programs such as Vermont's new Pesticides Monitoring Program should be encouraged at a Federal level.

Two, consideration of ground water management as the uses of water apply to the values; and that the predominant value is to minimize risks to the resource, rather than apply standards to regulate proposed uses. Section 303 (c)2 says; ". . . Such revised or new water quality standard shall consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses."

Three, safe Drinking Water legislation should have stronger enforcement and more explicit contaminant levels for toxics in drinking water, as well as provisions for polluters to provide alternative water supplies when liability is determined.

We appreciate the hard work you and your committee has put into reauthorization of the Clean Water Act, Mr. Chairman, and for the opportunity to speak before you today. Thank you.

Senator STAFFORD. Thank you very much, Mr. Palola. Now Mr. Spangler, we'll be happy to hear from you.

STATEMENT OF CARL SPANGLER, VICE PRESIDENT FOR PLANNING, KILLINGTON, LIMITED

Mr. SPANGLER. Thank you, Senator, for the opportunity to appear before you today. I too, have an excuse. I heard about the hearing a little bit late and I didn't get any prepared testimony ready in advance, but I would be more than happy to get my remarks typed up following the conclusion of this hearing.

For the record, my name is Carl Spangler. I am presently vice president of planning for Killington Limited. My past involvement in the areas of ground water involve being director of a regional planning commission in the State of Vermont, also being associated with the Agency of Development and Community Affairs for a number of years, which pulled me into some of the discussions on ground water and surface water protection.

What I would like to do, very quickly, is run over what I've put together as a laundry, list of all the laws, rules, regulations, and guidelines that a developer in the State of Vermont must be concerned with. Mostly ground water, but of course, as the VNRC has already mentioned there is a close relationship between ground water and surface water so it's pretty much interrelated.

Senator STAFFORD. Mr. Spangler, let me interrupt just to ask, Killington Limited that's Killington—the overall holding company for Killington Development and skiing areas in Rutland County, am I right?

Mr. SPANGLER. Killington Limited is the former Sherburne Corp. Killington Limited is the wholly owned subsidiary of SKI Limited.

Senator STAFFORD. And, who owns that?

Mr. SPANGLER. A group of stockholders.

Senator STAFFORD. Preston Smith is the president and CO?

Mr. SPANGLER. Correct.

Senator STAFFORD. They own another ski area in the southern part of the State as well as Killington.

Mr. SPANGLER. That is correct.

Senator STAFFORD. Just so the record will show.

Mr. SPANGLER. Killington Limited, even to be a little bit more specific, is the owner and operator of the Killington Ski Area in Central Vermont. For the laundry list, I can go over this quite quickly, but it is a long list.

First of all, the Vermont Health Department Regulations dealing with public water supply. Any public water supply in this State is regulated by the health department and any future development around that water supply, particularly onsite water supplies using wells is regulated by the health department as long as it is a public water supply.

Public building regulations. The onsite disposal of waste water is very much regulated by the State of Vermont. The location of future development, once again, comes under scrutiny and the design and construction standards for all the facilities related to the treatment and disposal of waste water are quite stringent. which I'll mention a little bit later. We have the subdivision regulations of the State of Vermont which insures that future development, when and if it occurs, on certain parcels of land adequately dispose of waste water.

We have the aquifer protection program which Larry Becker and Dave Butterfield mentioned earlier. It's interesting, the aquifer protection program has been around for about 3 years, I believe. It's not a law, it's not a rule, it's not a regulation, it's a guideline, but it's a guideline that quite frequently gets implemented through criterion 1 and criterion 2 of Act 250. I must say, the aquifer protection program, even though it does not have the force and effect of regulation or law certainly does have that implication through the Act 250 process.

Moving on, we have Vermont statutes, specifically chapter 47, the Water Pollution Control Act. We have the Vermont Environmental Protection Rules which impose some very very difficult design, construction and operating standards on waste water treatment and disposal facilities. From my prospective, looking at nearby States, these environmental protection rules impose some of the most stringent and, some people would say, unreasonable design, construction, and operational standards of any State. Some have even called them a taking of development rights, but I don't think we'll go that far today.

One of the good things coming out of the aquifer protection program is that it will be implemented as the Agency of Environmental Conservation moves through the rule making process on S. 11 or Act No. 53, which is the Ground water Strategy Act that was passed this session. Also, some local zoning bylaws are now starting to implement or, I guess, at least look to the aquifer protection program; local communities are updating their town zoning bylaws by taking a look at the APA program, taking a look at the maps that go along with it.

We've heard earlier about the underground storage tank legislation that was passed this session, the mini Superfund legislation for correction existing problems, we have existing sanitary landfill regulations and then maybe on the bottom of the list is Act 250 itself which serves as, perhaps, a safety net or at least a mechanism to draw all of these other rules, regulations, and bits of legislation together so that proper decisions can be made with the most amount of information available.

The bottom line for the development community in this State is that we have to deal with a very complex and stringent set of laws, rules, regulations, and guidelines. I should throw in, parenthetically, the question, are we already over regulating with respect to ground water. From my prospective, having been involved with many development projects that are affected and have been affected by the laundry list, I just referred to, we do not see any Federal involvement here in Vermont. I cannot speak for other States, but I strongly suspect that once again, Vermont has, in many respects, pioneered the way for other States for ground water protection as it did years ago for surface water protection.

We have laid the basis here in Vermont for our own ground water protection strategy that makes sense for Vermont. And, as an aside, when I put my laundry list together, I sat back and I thought, my goodness what would happen if we combined all of those rules and regulations with the interest in prime agricultural land and put on a map of State and Federal land that's already in the State and lands over 2,500 feet and deer yards and so on and so forth. We almost have our own State landuse plan effective.

In summary, I suppose some would say that what we really need from the Federal Government is money. I would like to think that we could use the money but can we afford the strings and the conditions that go along with that money. My feeling is no, we can't afford that. Also, if there was Federal involvement here it raises an issue that is very near and dear to the hearts of some people in the development community.

If there was Federal involvement and ground water quality standards, I think it would open Vermont to legal attacks from outside groups and non-Vermont groups and organizations. Presently, Vermont's Environmental Protection Rules are under attack by a Connecticut based organization and by a Washington based anti-development public interest group. This attack is a class action or a citizen suit and is basically made possible because of the current EPA regulations surrounding the National Pollution Elimination Discharge System Program.

This suit was filed in Federal District Court on July 3. Federal involvement in this issue, the issue of ground water protection, would provide another opportunity for non-Vermont groups to impose non-Vermont values, standards, and water quality criteria on the residents of a State that has already made its commitment through the adoption and enactment of tough regulations and legislation.

What could the Federal Government do to assist Vermont in preserving and maintaining high quality ground water? I suspect it's probably in the area of research. I don't know if it would be appropriate to locate this responsibility in the Office of Technology Assessment, but at some place in Federal Government there should be a research arm that can provide States like Vermont with the necessary expertise to further evaluate its own rules and regulations. This is a very complex subject, the issue of ground water, and I really don't think that this State or any other State has the resources to fully understand how to regulate land use to promote water quality, particularly ground water quality.

Three items basically, first, I think that the research needs to be done on how to designate aquifer protection areas itself. We have a system here in the State of Vermont that private consultants, that I work with, question considerably. Second, we need to have a complete evaluation of what development really means insofar as ground water quality.

There's a big debate among all the experts as to whether certain types of development can or should happen in aquifer protection areas or within certain distances of public water supplies. I don't believe there is a definitive body of knowledge that accurately assesses that issue. Last, as I mentioned before, probably a research capability available to the States so that when States do pass their own laws and regulations they can do so knowing that they're going to be reliable and valid. From the prospective of one segment of the Vermont development community, I believe this State is already well on its way to developing a very strong ground water protection strategy and Federal legislation or regulatory involvement is not necessary at this time.

Senator STAFFORD. Thank you, Mr. Spangler. As a result of being a native of Rutland, I have watched Killington grow from the time Preston Smith and I were skiing together and he had a bunch of snow depth figures in his pocket before Killington began. So, I've watched it grow until events outside of my control forced me to stop skiing some years ago, so I haven't seen much of what you've done since then.

I do have a few questions for the panel, which could be answered either now or in writing, whatever is the preference of panel members. Let me ask this one, should the Federal Government require every State to have a program to protect ground water? And, if so, what minimum requirements should the Federal program include? Mr. Lash.

Mr. LASH. I'll be happy to jump in as the only member of the panel who didn't say much about Federal requirements.

Our chief concern is that there will be Federal legislation and Federal regulation following our efforts to implement our own legislation that will require us to redo everything we've done and take a different approach than we've taken. We have had that experience before, the most difficult experience has been with the regulations under the Resources Conservation and Recovery Act in which we, among many States, have begun to implement a program before Federal requirements were imposed and had a terrible time getting our program to fit their regulations.

The Federal statute requiring States to take action on ground water is appropriate. I think that it is a national problem and all States should deal with it. I think that it is appropriate for the Federal Government to tell us, in terms of minimum water quality levels, what is necessary and acceptable. I think it is appropriate for the Federal Government to supply us with basic data standards, assumptions in terms of what kinds of activities have what potential impacts on ground water. We simply aren't able to develop all that data ourselves. We are able to implement our statute ourselves. We are able to develop an appropriate approach for this State to controlling the risks that we face in this State. I think that if Federal legislation is enacted it should leave us with that freedom.

Senator STAFFORD. Anyone else wish to comment here?

Mr. PALOLA. I'll just follow up a little bit with what I have to say, Senator. Basically, I agree with the Commissioner that I think it would be appropriate for the Federal Government, at a policy level, to encourage States to undertake ground water management programs. I mentioned, section 104 which is the area where the Federal Government can feed assistance either monetary or through scientific research to the States. I think that's probably the most appropriate place to do that.

Senator STAFFORD. All right. Thank you, gentlemen. Could any of you, if you care to, comment on the value of, or problems with, EPA's ground water strategy that was issued last August? If you could care to respond to that in writing, that would give you a chance to examine it.

Mr. LASH. I think I can give you a short answer, Senator.

Senator STAFFORD. All right.

Mr. LASH. I assumed my present position at the beginning of February of this year, but so far as I know EPA's ground water strategy does not have much impact on the State and on our efforts to protect ground water.

Mr. BUTTERFIELD. The thing we would be most concerned about was that if the classification in the national strategy were such that Vermont would be precluded from getting their share of Federal grants under the program, because all of our ground water is going to fit into the second classification in the national strategy.

Senator STAFFORD. Thank you, Mr. Butterfield. One final question, what are the key ground water research needs and which level of Government is best suited to carry out which aspects of research?

Mr. LASH. Perhaps we should give you a written answer to that one, I think. That's a bread and butter question for us.

Senator STAFFORD. All right. We'd be very pleased to get it that way. Gentlemen, that concludes the questions I have in mind. I want to express my appreciation to all of you for your help as we start this years efforts on clean air and several other problems including ground water. David Durenberger, the Senator from Minnesota, will probably head the committees effort in this area in the second of our two environmental pollution subcommittees but I'm getting a little head start for him. Thank you all very much.

The final witness today will be Dr. Sinclair Allen who will speaking on behalf of the Vermont Lung Association of South Burlington. Doctor, we thank you for your patience in waiting until now and we appreciate your being here this afternoon. Your ambassadors have been in Washington recently, Peggy Garland, for example to make sure that the center for Vermont is aware of the attitudes of the Vermont Lung Association and the Nations.

STATEMENT OF SINCLAIR T. ALLEN, JR., M.D., VERMONT LUNG ASSOCIATION

Dr. ALLEN. Mr. Chairman, I hope that nothing I have to say will be repetitious of what Peg Garland told you.

Senator STAFFORD. No, it will not, I'm sure.

Dr. ALLEN. Mr. Chairman, I am Sinclair Allen, a physician specializing in diseases of the lung. As chairman of the Vermont Lung Association's Environmental and Occupational Health Committee, I am appearing today on behalf of, not only our 55,000 supporters, but of the half million citizens of our Green Mountain State whose health and lives depend on the purity of the air we breathe. We speak not as a special interest group, for the quality of air cannot be considered a special interest. Indeed, it cannot be considered apart from the quality of life itself.

Historically, the goal of the Vermont Lung Association's air conservation program has been the prevention and control of air pollution in order to protect Vermonters from adverse health effects of exposure to air pollution. The VLA has worked for years with region 1 EPA officials, the Vermont Agency of Environmental Conservation, and other interested parties in improving and maintaining the air quality of Vermont and the environmental health of all Vermonters. To this end the Vermont Lung Association has made the reauthorization of a strong Clean Air Act a priority legislative objective this year.

The VLA has had the opportunity to present testimony on the Clean Air Act and acid rain on previous occasions. In recognition of the diversity of concerns expressed in this hearing, we will reiterate our emphasis on the public health concerns addressed in the Act.

So much attention on the long range transport of sulfur pollution has been given to ecological effects—acid rain—that many have overlooked the effects on public health that this long-range transport poses.

I would like to begin with a brief review of the health effects of precursor pollutants of acid rain. To pinpoint and analyze the effects of these pollutants, sulfur dioxide and its transformation products of acid sulfates and sulfate salts, toxicological studies, clinical studies and epidemiological studies have been conducted. Health studies have focused on the impact of sulfur pollutants on the clearance of foreign matter from the respiratory tract and defenses against infectious agents, respiratory mechanics, aggravation of respiratory and cardiovascular disease, and mortality.

In clinical studies of healthy subjects at rest, respiratory and cardiovascular responses have been consistently observed at exposure levels of 5 parts per million SO_2. The findings of several investigators suggest potentiation of SO_2's airway effects with mouthbreathing and increased exercise levels, or both. Studies suggest bronchoconstriction in healthy adults orally breathing SO_2 concentrations of 1.0 to 2.5 parts per million.

Senator **Stafford**. Doctor, I'm a layman and maybe it would be well for the record, if you could, when you talk about bronchoconstriction in healthy adults how serious that constriction might be. Is that something that seriously impairs breathing?

Dr. **Allen**. Yes; but it's temporary. I think the relation of exposure to sulfur dioxide to chronic permanent disease is not something I could make any definite statements about.

Senator **Stafford**. I would gather from what you have said, though, that in a person—hyperactive person sensitive to sulfur oxides an asthmatic or somebody in that condition that it would be a much more serious constriction than in a healthy adult who did not have either of these inflictions, is that correct.

Dr. **Allen**. That could lead to hospitalization and emergency room treatment.

Senator **Stafford**. All right. Thank you. Pardon the interruption, but I thought we should try to understand this for somebody with only a lay background.

Dr. **Allen**. Of greater concern is the impact of SO_2 on hyperreactive individuals—those particularly sensitive to airway constriction such as asthmatics and persons with hay fever. In some asthmatics bronchoconstriction occurred at levels as low as 0.25 parts per million SO_2.

Inhalation of sulfuric acid mist—0.35 to 5.0 mg/m3—increases respiratory rate and decreases airflow rates and breathing volume. One study found that mucociliary clearance of the trachea and bronchus was increased at 100 ug/m3 and decreased at 1000 ug/m3. The decreased clearance rates, while transient, raise the possibility of more persistent or chronic depression of clearance with repeated exposure to the same concentration of sulfuric acid.

In studies with asthmatic subjects, changes in airway function have been demonstrated after exposure to sulfuric acid at concentrations less than 1000 micrograms per cubic meter. At 500 micrograms per cubic meter and higher, reduction in airflow and the volume of air that can be exhaled have been observed in adult asthmatics after sulfuric acid and ammonium bisulfate exposures. In a group of adolescent asthmatics exposed at rest for one-half hour, followed by 10 minutes of moderate exercise, significant changes in pulmonary function occurred with a sulfuric acid concentration of 100 micrograms per cubic meter.

Particulates often occur together with sulfur oxides. Particulates are solid particles or liquid droplets many of which are smaller than 1/10,000-inch, which can cause problems in the deepest, most sensitive parts of the lung. These acid sulfates can increase the incidence and severity of respiratory diseases such as bronchitis and emphysema.

Photochemical oxidants, primarily ozone, irritate the mucous membranes of the respiratory system. This irritation results in coughing, choking, and impaired lung function, primarily in people who exercise. Chronic respiratory diseases such as asthma and bronchitis are aggravated by ozone and oxidants.

Carbon monoxide, a deadly-colorless gas, displaces oxygen in the bloodstream; resulting in impaired perception and thinking; slower reflexes and drowsiness. Inhalation of carbon monoxide by pregnant women may retard the unborn child's growth and mental development.

These are some of the proven health effects of air pollution. The question is: Who in Vermont is subject to these? The answer is: Everyone, with an even greater risk for certain Vermonters; specifically:

Infants and children under age 2 all of whom are extremely sensitive to the effects of air pollution due to lung structures that form in the first 2 years of life.

Children before ages 8 to 10, as children do not have fully developed immune systems to combat respiratory pathogens and pollutants.

People over 65 years as they have more chronic respiratory diseases than other population groups. The body's immune system decreases in effectiveness with age, resulting in increasing susceptibility to the adverse effects of air pollution.

People with chronic lung and cardiovascular diseases, as they have a difficult time meeting their body's needs for oxygen without being further stressed by air pollution.

The evaluation of public health risks from air pollution is a seemingly straight forward matter—a series of dose-response relationships are applied to a set of pollution measurements of population exposure. These determinations, however, are subject to considerable disagreement within the scientific community. Still while opinions differ on the magnitude of effects from exposure to air pollutants, the consensus is that increased air pollution and in particular SO_2 emissions, will be associated with worsened health of the general public. Under severe pollution conditions, each incremental micrograms per cubic meter in sulfate levels may cause 1 to 14 deaths per 100,000 persons per year according to various risk estimates.

The national ambient air quality standards are the cornerstone of the Clean Air Act and have been the driving force responsible for progress toward improving the quality of our Nation's air resources. Retention of the provisions providing for the definition of the standards and the standard-setting process will reaffirm three essential health concepts: First, the standard must protect against adverse health effects in all population groups including the particularly sensitive subpopulations; second, the margin of safety is necessary to compensate for gaps in our knowledge about the effects of air pollution; third, the standard must be health-based with cost considerations separated from the identification of adverse effects and the development of a protective standard.

I encourage the committee to follow closely the standard setting for sulfur dioxide, specifically for a short-term 1-hour standard. The 0.25 part per million for 1 hour could result in a reduction of sulfur emissions in the range of 6 to 7.5 million tons.

The VLA believes there is an urgent need for development of a national ambient air quality standard for fine particles. The EPA should rapidly expand the research program in health effects of fine particles to support the standard-setting process.

A critical factor in the progress toward clean air has been the congressionally mandated dealines to achieve the NAAQS. However, some areas subject to the act's 1982 deadlines failed to achieve the standards on time. A small portion of the country subject to the act's 1987 deadlines are also expected not to achieve the standards on time. I urge the committee to monitor EPA activity in preparation for the 1987 deadlines. EPA's proposed reasonable further efforts program is designed to make SIP changes and avoid sanctions for nonattainment areas missing the 1987 deadlines. Our concern is that there is no provision in the law for this activity, and that the law is very clear on sanctions.

The burden of paying for the disposal of wastes from industry cannot be removed by legislation; it can only be shifted. Either industry will pay for the clean disposal or its own wastes, making that expense a fair part of its price to consumers, or citizens will involuntarily pay for pollution with their health, their health-care dollars, and some will pay with their lives. The burden then will fall most heavily on those unable to control it: unborn and very young children, the elderly, and the chronically ill.

Unlike most other health risks in our society, air pollution offers no choice. We must breathe the air. The only way we can manage this risk is through our Government. We are thankful for a Government which has traditionally placed the right of the people to health and safety above the desire of anyone for financial gain.

We recognize that the health benefits of the act cannot be separated from other provisions. The VLA urges caution as the committee addresses these other sections. A prudent public health policy can allow for no weakening of the act's current provisions. The Clean Air Act has led to substantial improvements in the quality of the Nation's air resources and further progress can and should be made.

Thank you for this opportunity to comment.

Senator **Stafford**. Thank you very much, Dr. Allen. I agree completely with your view that the ambient air quality standards must continue to be set based only on health considerations.

In connection with ambient air standards let me ask the following question, EPA, with concurrence from its Clean Air Advisory Committee, recently proposed retention of the existing ambient air quality standard for sulfur dioxide. The Agency suggested that further intensive studies should be carried out to determine if a 1-hour standard for SO_2 is needed. Based on your medical experience do you believe there is a sufficient health evidence at this point to set a 1-hour standard?

Dr. **Allen**. I can't honestly say that my own experience bears on this. As was stated in the text, a one hour standard would appreciably reduce the amount of sulfur dioxide that omitted into the air. You know, what I'm really trying to say is that the people that set those standards know much more about it than I do and I trust them.

Senator **Stafford**. All right, sir. Thank you. In your opinion can we address health problems associated with sulfur compounds using only a standard for SO_2 or do we also need a sulfate standard or some other form of sulfur standard. If you'd prefer to answer these in writing, Doctor, just say so.

Dr. **Allen**. Well, I'd prefer to answer them in writing, but I really think that sulfur dioxide and sulfates and sulfuric acid exist in sort of interchange in the atmosphere so that if you measure one you're measuring the others.

Senator **Stafford**. Do you know if there are areas in Vermont where levels of criteria pollutants at times are high enough to constitute threats to the health of particularly sensitive people in the State?

Dr. **Allen**. I can't point to specific pollutants. I certainly believe that there are certain qualities of the air that produce exasperation. We'll see for 2 or 3 weeks a very low incidence of what we call acute respiratory failure and then for 2 or 3 weeks a very high one. It seems to correlate with atmospheric conditions.

Senator **Stafford**. Some pictures of atmospheric haze that we saw this morning, indicated that under the worse conditions of haze, there must be times when there is enough sulfur dioxide or sulfates or sulfuric acid in this area to, under your statement, to cause certainly bronchoconstriction in asthmatics and others, wouldn't you agree?

Dr. **Allen**. I believe that's true.

Senator **Stafford**. Thank you very much, Dr. Allen. Again, we appreciate your joining us here and always appreciate your help on these issues.

Dr. **Allen**. Thank you for your listening.

Senator **Stafford**. With that, unless there is further business for the committee, again expressing the committees appreciation for all who have joined us today I'm going to declare this meeting of the Environment and Public Works Committee of the U.S. Senate adjourned.

[Whereupon the hearing was adjourned to reconvene at the call of the Chair.]

[Statements and other material submitted for the record follow:]

GOVERNOR MADELEINE M. KUNIN
TESTIMONY
JUNE 22, 1985

WE GREATLY APPRECIATE YOUR HOLDING THIS HEARING TO PROVIDE US THE OPPORTUNITY TO DISCUSS CURRENT ENVIRONMENTAL PROBLEMS AND EFFORTS IN VERMONT AND TO COMMENT ON ISSUES YOUR COMMITTEE IS FACING IN WASHINGTON.

FIRST, LET ME CONGRATULATE YOU ON YOUR LEADERSHIP IN WINNING UNANIMOUS SENATE APPROVAL FOR THE CLEAN WATER ACT AMENDMENTS OF 1985. WE ARE PARTICULARLY PLEASED WITH THE INCREASED ALLOCATION TO VERMONT OF SEWER CONSTRUCTION FUNDING. WE ALSO BELIEVE THAT THE SENATE VERSION PRESENTS A LOGICAL AND WORKABLE BRIDGE TOWARD THE ESTABLISHMENT OF STATE REVOLVING LOAN PROGRAMS AS THE LONG-RANGE STRATEGY FOR WASTEWATER TREATMENT FACILITY FINANCING.

OUR PRESENTATION TO YOU THIS MORNING WILL FOCUS ON THREE TOPICS: ACID DEPOSITION, HAZARDOUS AIR POLLUTANTS AND GROUNDWATER. IN EACH OF THESE AREAS, WE WILL DESCRIBE OUR CURRENT ACTIVITIES HERE IN VERMONT AND AN OPINION OF WHAT ACTION WE WOULD LIKE TAKEN IN WASHINGTON. BECAUSE YOU WILL BE HEARING FROM COMMISSIONER LASH AND OTHERS ON THESE TOPICS, I WILL CONFINE MY REMARKS TO TWO ISSUES OF PARTICULAR CONCERN TO ME.

THE FIRST IS THE CURRENT SEARCH BY THE DEPARTMENT OF ENERGY FOR A HIGH-LEVEL NUCLEAR WASTE REPOSITORY. THIS MAY NOT BE CONSIDERED TO BE A MATTER WITHIN YOUR COMMITTEE'S JURISDICTION, BUT IT IS A MOST URGENT ENVIRONMENTAL ISSUE HERE IN VERMONT. THE SECOND IS THE SO-CALLED "TALL STACKS" REGULATION RECENTLY ISSUED BY THE ENVIRONMENTAL PROTECTION AGENCY.

I WILL BE RELATIVELY BRIEF ON THE HIGH-LEVEL WASTE PROBLEM AND SUBMIT FOR THE RECORD A LETTER TO SECRETARY HERRINGTON OF DOE EXPLAINING AT GREATER LENGTH MY FUNDAMENTAL OBJECTIONS TO THE CRYSTALLINE ROCK REPOSITORY PROJECT. IN THAT LETTER I STATE MY SERIOUS DOUBTS ABOUT THE SCIENTIFIC VALIDITY OF DOE'S BASIC ASSUMPTION THAT ROCK FORMATIONS EXIST IN THE EAST THAT ARE APPROPRIATE FOR SAFE NUCLEAR WASTE STORAGE. CRYSTALLINE ROCK FORMATIONS ARE TYPICALLY FRACTURED AND CONTAIN GROUNDWATER IN VARYING QUANTITIES UNDER ARTESIAN CONDITIONS. THIS IS PARTICULARLY TRUE OF VERMONT GRANITE TO THE EXTENT OF OUR KNOWLEDGE.

MY UNDERSTANDING IS THAT UNLESS SAFETY IS GUARANTEED, THE SITE WILL NOT BE USED. SAFETY IS A FUNCTION OF THE SOLIDITY OF THE CHAMBER WALLS. THE PROBABILITY OF LOCATING A ROCK FORMATION AND CREATING A FRACTURELESS CHAMBER HAS NOT BEEN SCIENTIFICALLY ESTABLISHED. THEREFORE, THE SITE SEARCH PROCEEDS EITHER ON FALSE ASSURANCE OF INTENDED SAFETY OR ON INDEFENSIBLE PROSPECTS OF SUCCESSFUL CONCLUSIONS.

THE SECOND ISSUE OF DEEP CONCERN TO ME IS THE CRITERIA THAT ELIMINATES ROCK FORMATIONS IN ALL BUT SPARSELY SETTLED AREAS. WE ARE TOLD THAT THE DISPOSAL REPOSITORY WILL BE SAFE. IT IS DISGRACEFULLY CONTRADICTORY TO ARGUE THAT "INHERENT RISK," THE

TERM USED BY DOE SPOKESMEN AT HEARINGS HERE, DICTATES A RURAL SITE. I FIRMLY BELIEVE THAT IF THE FACILITY ISN'T FOOLPROOF, IT MUST NOT BE BUILT. IF IT IS, IT CAN BE LOCATED ANYWHERE, REGARDLESS OF POPULATION DENSITY. VERMONTERS RESENT THIS RURAL BIAS.

TWO OTHER CONCERNS WERE EMPHATICALLY EXPRESSED AT OUR PUBLIC HEARINGS HERE. ONE, WAS THE HAZARDS POSED BY TRANSPORTING THIS WASTE IN HILLY, OFTEN ICY COUNTRYSIDES TYPICAL OF NORTHERN NEW ENGLAND. THE ENTIRE TRANSPORTATION ISSUE IS FRAUGHT WITH DANGEROUS IMPLICATIONS BECAUSE, WHEREVER THE REPOSITOTY IS FINALLY LOCATED, WASTE WILL BE SHIPPED THERE FROM AND THROUGH MANY STATES. I DO NOT BELIEVE THAT DOE HAS ADEQUATELY ADDRESSED TRANSPORTATION QUESTIONS.

THE OTHER DISTURBING PROBLEM CREATED BY THE REPOSITORY SEARCH IS THAT THE 15 TO 20 AREAS THAT DOE WILL SINGLE OUT THIS YEAR FOR FURTHER STUDY WILL BE UNDER A HEAVY CLOUD FOR A PROTRACTED PERIOD. COMMUNITIES IN AN AREA IDENTIFIED AS UNDER STUDY FOR A WASTE REPOSITORY WILL FEEL THE IMPACT IN REDUCED REAL ESTATE VALUES, DIFFICULTY IN ATTRACTING COMMERCIAL AND INDUSTRIAL DEVELOPMENT AND IN RESIDENT ANXIETY, AND, VERY LIKELY, RESIDENT EXODUS.

I FULLY RECOGNIZE THAT A SOLUTION TO DEALING WITH MOUNTING PILES OF NUCLEAR WASTE MUST BE FORMED. WE IN VERMONT CURRENTLY DEPEND ON NUCLEAR GENERATED POWER FROM WITHIN OUR BORDERS. HOWEVER, TO SEIZE ON A SOLUTION BASED ON CONJECTURE IS

INDEFENSIBLE. MOREOVER, THE ADOPTED PROCEDURES ARE UNACCEPTABLE AND THE CONSEQUENCES IN TERMS OF COMMUNITY DISRUPTION AND HUMAN ANXIETY ARE UNJUSTIFIABLE.

I BELIEVE, SENATOR, THAT THE CONGRESS SHOULD TAKE ANOTHER HARD LOOK AT THIS PROCESS. RECONSIDERATION OF DOE'S STATUTORY MANDATE IS URGENTLY NEEDED. EVALUATION OF THE SCIENTIFIC VALIDITY OF THE CRYSTALLINE ROCK PROJECT IS IMPERATIVE. A THOROUGH REVIEW OF DOE PROCEDURES SHOULD BE INITIATED.

IN REGARD TO MY SECOND SUBJECT, THE "TALL STACKS" REGULATION, I MUST EXPRESS DISAPPOINTMENT THAT THE ENVIRONMENTAL PROTECTION AGENCY HAS ONCE AGAIN FAILED MISERABLY IN CARRYING OUT ITS STATUTORY OBLIGATIONS AS SPELLED OUT IN THE CLEAN AIR ACT AND RECENT COURT DECISIONS.

POLLUTING EMISSIONS FROM INDUSTRIAL AND POWER GENERATING PLANTS CAN BE CONTROLLED BY TREATMENT AT THE SOURCE OR THEY CAN BE DILUTED IN THE ATMOSPHERE BY CONSTRUCTION OF TALL STACKS.

CONGRESS, IN WRITING THE CLEAN AIR ACT OF 1970, PURPOSEFULLY HELD THAT USING AIR POLLUTION DISPERSION TECHNOLOGIES, SUCH AS TALL STACKS, WOULD NOT NECESSARILY SAFEGUARD AMBIENT AIR QUALITY REQUIREMENTS AND COULD RESULT IN INCREASED LOADING OF AIR POLLUTANTS TO THE ATMOSPHERE.

CONGRESS REAFFIRMED ITS INTENT TO MINIMIZE THE USE OF TALL STACKS IN LIEU OF EMISSION REDUCTIONS IN THE 1977 AMENDMENTS TO THE CLEAN AIR ACT, WHERE SPECIFIC LANGUAGE UNDER SECTION 123 RESTRICTED APPLICATION OF EXCESS STACK HEIGHT.

THE PURPOSE OF SECTION 123, THE TALL STACK HEIGHT SECTION, WAS TO DEFINE THE LIMITS AND APPROPRIATE USE OF TALL STACKS AS AN AIR POLLUTION CONTROL TECHNIQUE. CONGRESS WISHED TO LIMIT THE POTENTIAL FOR ABUSE OF TALL STACK EMISSION REDUCTION CREDITS.

IN 1979 EPA ISSUED A PROPOSED RULEMAKING REGARDING STACK HEIGHTS. THIS PROPOSED RULEMAKING WAS INCONSISTENT WITH THE CLEAN AIR ACT AND SUBSEQUENTLY CHALLENGED IN THE COURTS. EPA IN 1982 PROMULGATED REVISIONS TO ITS STACK HEIGHT REGULATIONS WHICH WERE ONCE AGAIN CHALLENGED IN THE COURTS.

THE LATEST COURT DECISION, IN SIERRA CLUB VS EPA, AGAIN MANDATED REVISION. THESE REVISED REGULATIONS WERE PROMULGATED ON JUNE 27 OF THIS YEAR.

WE FIND THESE REVISED REGULATIONS TO BE FLAWED, NOT REFLECTING THE INTENT OF THE COURTS OR THE CLEAN AIR ACT. SPECIFICALLY, WE DO NOT AGREE WITH EPA'S POSITION ON WHEN EMISSION REDUCTION CREDITS DUE TO STACK HEIGHT CAN BE USED INSTEAD OF EMISSION CONTROLS. WE BELEIVE IN A MORE STRICT DEFINITION OF STACK HEIGHT CREDIT AS A DISPERSION TECHNIQUE, AS DEFINED BY CONGRESS.

USE OF TALL STACKS AS THE PRIMARY SO_2 CONTROL METHOD HAS EXACERBATED REGIONAL PROBLEMS IN VISIBILITY AND INCREASED THE DISPERSION OF ACID RAIN PRECURSORS, THUS INCREASING THE EXTENT OF THE ACID RAIN PROBLEM. EPA'S POLICY ON STACK HEIGHTS HAS LED TO INCREASED LOADING OF AIR POLLUTANTS INTO THE ATMOSPHERE BY AN ESTIMATED 10 MILLION TONS SO_2 OVER THE PAST FIVE YEARS.

POTENTIAL REDUCTIONS OF SO EMISSIONS OF 1.7 MILLION TONS/YR CAUSED BY THE EPA REVISIONS IN THE STACK HEIGHT REGULATIONS ARE VIRTUALLY INSIGNIFICANT COMPARED TO THE ENORMOUS YEARLY EMISSION OF SO NATIONWIDE OF 22-23 MILLION TONS/YR.

ACCORDING TO THE NATIONAL RESOURCES DEFENSE COUNCIL, MORE STRINGENT REGULATIONS, CONSISTENT WITH THE INTENT OF CONGRESS, WOULD CAUSE A REDUCTION OF AS MUCH AS 8.5 MILLION TONS/YR IN SO EMISSIONS.

IT IS MY UNDERSTANDING THAT PROPOSALS HAVE OR SHORTLY WILL BE INTRODUCED IN THE HOUSE AND IN THE SENATE THAT WOULD TIGHTEN THE LANGUAGE OF SECTION 123 TO CLARIFY THE INTENT OF CONGRESS IN CURBING TALL STACK POLLUTION. WHILE THIS IS NOT A SATISFACTORY SUBSTITUTE FOR COMPREHENSIVE SO EMISSIONS CONTROL LEGISLATION, IT WOULD ACCOMPLISH SIGNIFICANT RECUCTION IN ACID DEPOSITION. IT WOULD BE A STEP FORWARD AND A SIGNAL THAT THE CONGRESS IS SERIOUS ABOUT THE PERSISTENT AND ALARMING PROBLEM OF ACID RAIN AND RELATED TRANSPORT OF AIR POLLUTANTS.

WE CANNOT CONTINUE THE STALEMATE ON ACID RAIN LEGISLATION. WE WILL BE PRESENTING SHORTLY OUR EVIDENCE OF SERIOUS PROBLEMS OF VISIBILITY IMPAIRMENT, FOREST DAMAGE AND AQUATIC IMPACT WHICH WE ARE PERSUADED ARE RELATED TO THE TRANSPORT AND DEPOSTIION OF SULFATES AND OTHER POLLUTANTS FROM OUTSIDE OUR BORDERS. WE PAY FOR OTHERS' POLLUTION. THE ECONOMIC COSTS ARE REAL. A RECENT

STUDY PUT THE PRICE TAG AT $5 BILLION FOR A 17 STATE REGION. THE CONSEQUENCES IN EROSION OF THE QUALITY OF VERMONT'S ENVIRONMENT ARE DEPLORABLE.

I ASK YOU TO GIVE CAREFUL CONSIDERATION TO THESE TWO AREAS OF MAJOR CONCERN TO THE STATE OF VERMONT.

AS YOU SO WELL KNOW FROM YOUR OWN KNOWLEDGE OF VERMONT'S ENVIRONMENTAL COMMITTMENT -- OUR CONCERN FOR CLEAN AIR AND WATER AND A SAFE ENVIRONMENT IS NOT AN AFTERTHOUGHT -- IT IS PART AND PARCEL OF OUR VERY EXISTENCE.

ON THE ACID RAIN ISSUE -- WHAT WE CAN NO LONGER TOLERATE IS DELAY. I PERSONALLY FEEL A SENSE OF URGENCY ON THIS ISSUE, IT DEMANDS ACTION NOW.

CERTAINLY FURTHER STUDY MUST CONTINUE -- AND VERMONT WILL CONTINUE TO DO ITS SHARE AS WELL -- BUT WE CANNOT WAIT UNTIL EVERY "I" IS DOTTED AND EVERY "T" IS CROSSED. IT WILL BE TOO LATE. THE DAMAGE WE SEE OCCURING TODAY AT THE TOP OF CAMEL'S HUMP WILL NOT BE AN ISOLATED OCCURENCE, BUT WILL, IN THE FUTURE, BE WITNESSED THROUGHOUT OUR COUNTRY.

IT IS ACTION IN THE UNITED STATES CONGRESS WHICH CAN AND MUST SET THE AGENDA FOR A STRONG NATIONAL POLICY WHICH STATES THAT THE CONTROL OF ACID RAIN IS A NATIONAL, NOT A REGIONAL RESPONSIBILITY. WE WILL ALL BE AFFECTED BY IT, AND WE MUST ALL FACE THE BURDEN, AND TO SOME EXTENT, THE COST, OF REVERSING COURSE, BEFORE IT IS TOO LATE.

ON THE ISSUE OF HIGH LEVEL NUCLEAR WASTE DISPOSAL, I URGE YOU TO MAKE THIS A NATIONAL ISSUE AS WELL. IT IS NOT ONLY VERMONT'S CONCERN BECAUSE VERMONT IS A POTENTIAL DISPOSAL SITE. IT IS A NATIONAL PROBLEM WHICH REQUIRES SENSIBLE ACTION. THE PRESENT PLAN IS UNWORKABLE. LET US STRIVE FOR A MORE REALISTIC SOLUTION TO THE SAFE STORAGE OF THESE WASTES.

THANK YOU KINDLY FOR THIS OPPORTUNITY TO STATE OUR CASE.

MADELEINE M. KUNIN
GOVERNOR

STATE OF VERMONT
OFFICE OF THE GOVERNOR
PAVILION OFFICE BUILDING
MONTPELIER, VERMONT 05602
(802) 828-3333

April 30, 1985

John Herrington, Secretary
Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Dear Secretary Herrington:

I am writing you to express my strong objection to your consideration of crystalline rock formations in Vermont for a high level radioactive waste disposal repository. I further oppose the continuation of your search because it evokes great anxiety and is based on criteria that are flawed in so far as standards are both untested and/or untestable and can not be proven except over time intervals never attempted in the history of the human race, and that population assessments are biased against rural areas.

To reemphasize my opposition to your continued search in Vermont I stress the following two conclusions: One, that your criteria includes a bias against rural areas, and two, that the Vermont crystalline formations are not geologically appropriate for the construction of a safe repository.

The rural bias is of particular concern to me, as the Governor of a rural state. If such a facility is safe anywhere, I seriously question why a greater risk is deemed acceptable in sparsely populated areas.

My expression of concern stems from a hearing on April 24 in Charlestown, Vermont when a Crystalline Repository Project Team provided a briefing on the process being undertaken by the Department of Energy to locate a suitable site for an underground high level radioactive waste disposal repository in the eastern United States. The team did its job in a professional manner under very trying circumstances and my distress does not arise from their attitude but rather with the issues their presentation raised.

I must seriously question the continuation of the search until certain factors are clarified. First among them is the possibility that a rock formation appropriate to safe nuclear waste storage actually exists. Crystalline rock formations are typically fractured and contain ground water in varying quantities under artesian conditions. The DOE geologist at the Charleston meeting acknowledged this fact. On the other hand, the team continually insisted that the 20,000 square foot chamber would be inspected inch-by-inch to insure that no fissures existed. The presence of cracks would render the site unusable. I am highly skeptical that such a potential chamber can be tested adequately and still preserve the natural state that is claimed to be the most important long term barrier to radionuclide transport. The drilling required to properly test a complexly fractured crystalline rock will compromise the required integrity of the site.

My understanding is that unless safety is guaranteed, the site will not be used. Safety is a function of the solidity of the chamber walls. The probability of locating a rock formation and creating a fractureless chamber has not been scientifically established to my knowledge. Therefore, the site search proceeds either on false assurances of intended safety or on indefensible prospects of successful conclusion.

The second issue of deep concern to me is the criteria that eliminates rock formations in all but sparcely settled areas. We are told that the disposal repository will be safe. It is disgracefully contradictory to argue that "inherent risk," the term used by your spokesman, dictates a rural site. I firmly believe that if the facility isn't foolproof it must not be built. If it is, it can be located anywhere.

I am emphatically opposed to the continuing search for a suitable site in Vermont because I do not believe such a site exists, and particularly in this state's fractured cyrstalline rocks. Moreover, I consider the low-density criteria indefensible and discriminatory against rural states. I believe that Vermonters and our neighboring Canadians have been unjustifiably frightened by this ill-conceived project.

Let me assure you that I am keenly aware of Vermont's responsibility to share its fair burden as we strive to find a solution for nuclear waste disposal. As a producer of nuclear waste at Vermont Yankee, we have an obligation to be part of the solution. However, we have an equal responsibility to speak out against a proposal which we believe to be unsound, both from a scientific and a "fairness" point of view.

I urge you to reassess your present policy and to establish revised criteria as you continue your search for an eastern location for a high level radioactive waste disposal repository.

I recognize that in challenging the validity of the premises on which the project goes forward I am challenging part of your congressional mandate. In light of the recent hearing and the information revealed, I find this fully justified.

Sincerely yours,

Madeleine M. Kunin
Governor

MMK/bjf

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

Montpelier, Vermont 05602
Department of Water Resources
and
Environmental Engineering

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Water Resources & Environmental Engineering
Natural Resources Conservation Council
State Geologist

STATEMENT OF JONATHAN LASH, COMMISSIONER
DEPARTMENT OF WATER RESOURCES
BEFORE COMMITTEE ON ENVIRONMENT AND PUBLIC WORK
OF THE UNITED STATES SENATE
MONTPELIER, VERMONT
JULY 22, 1985

We are very pleased to have this opportunity to present testimony to you this morning. We are proud to be able to describe to you several pieces of new legislation that we think will make important contributions to environmental protection in Vermont and, of course, we are eager to tell you how we think the Congress and the Federal Environmental Protection Agency can help us in our efforts and to warn against policies that will only hinder our progress.

I have asked David Butterfield and Lawrence Becker, two members of my staff to joint me here this morning. Both have expertise in hydrogeology and considerable experience in the development of our groundwater protection policies. I will present a brief overview of our new legislation and they will talk about some of the practical implications of that legislation.

Vermont is blessed with ample groundwater resources. Unlike many other states our groundwater resources are present almost everywhere at shallow depths. There is unusually swift interaction between ground and surface water resources in most areas of the State. Well over half of our population depends upon groundwater resources for drinking, household and agricultural water supplies. There are some 60,000 wells and springs in the State.

Despite its importance until recently groundwater has been a neglected resource in Vermont. We have had no system of private rights to groundwater or of public protection of groundwater resources. With the most recent session of the legislature, however, that changed. Five separate bills passed that were largely motivated by concern about groundwater protection. These include bills regulating underground storage tanks, establishing private rights to groundwater, mandating a pesticide monitoring program, establishing a mini-superfund for the cleanup of hazardous waste and imposing strict liability on those responsible for creating hazardous waste programs, and finally a very innovative bill instructing my Department to classify and protect all of the groundwater in the State. It is on the latter bill that I will focus the remainder of my testimony this morning.

S-11, the groundwater protection bill, is designed to regulate activities that may pose a risk of groundwater contamination rather than regulating groundwater quality. It reflects both the difficulty of monitoring groundwater quality and the fact that once conditions causing groundwater contamination have been created it is very difficult and extremely expensive to correct them. There is no satisfactory method for cleaning up a contaminated aquifer.

The Legislature has instructed us to place all of the known groundwater resources in the state in one of four classes ranging from Class 1, which is intended to establish permanent and complete protection for significant sources of public drinking water, to Class 4, which covers those aquifers already subject to substantial risk which we are willing to expose to additional risks, always within the context that our goal is to conduct all activities in the State without creating environmental contamination.

There are over 300 landfills in the State, and scores of treatment plants, industrial facilities and storage areas that could pose risks to groundwater. We already deal with 200 or more spills and 50 leaking underground tanks each year. We are investigating more than 40 sites we suspect may be contaminated by petroleum or toxic waste.

Although it does require us to classify groundwater resources the legislation does not establish a new permitting program. Instead it instructs us to recognize and comply with the classifications in administering our existing air, surface water, hazardous and solid waste regulations. Thus the groundwater classifications will place sensible limits on where certain activities that could create a risk of contamination of groundwater can take place. These could range from municipal salt storage or municipal sewage treatment plants to filling stations and industrial facilities. As the presentation by Mr. Butterfield will make clear we do not expect that the requirements of our groundwater protection policy will place serious constraints on development activity within the State. However, where constraints are imposed the will be urgently necessary.

The most serious limitation on our capacity to effectively implement this legislation is our lack of knowledge. Although we have been mapping aquifers that serve as public water supplies for several years we are far from having a comprehensive understanding of all of the groundwater resources in the State and the quality of some of the data that we do have is suspect. We are cooperating with the School of Natural Resources at the University of Vermont in an effort to increase our understanding of groundwater resources and their geographical relationship to other natural resources and human activities. As our knowledge improves our capacity to protect the resource will improve markedly.

Thank you very much for the opportunity to appear before you today. I will be happy to answer any questions you may have.

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STATEMENT OF RICHARD L. POIROT, AIR QUALITY PLANNER
VERMONT AGENCY OF ENVIRONMENTAL CONSERVATION
BEFORE
U.S. SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
SENATOR ROBERT T. STAFFORD PRESIDING
MONTPELIER, VERMONT, July 22, 1985

Of the many damages and potential damages that ultimately result from the emission, chemical transformation, atmospheric transport and deposition of sulfur containing compounds, one of the most thoroughly understood, but often neglected effects is the widespread degradation of visibility (regional haze) caused by airborne sulfate particulate when it is not washed out by the rain. At locations throughout North America, sulfate is the dominant visibility impairing pollutant, and is estimated to account for half the total extinction of light in the eastern United States. Inasmuch as regional haze and acid rain result from common origin and require similar remedies, we strongly recommend that the two effects be considered together in the development of a national or regional SO2 reduction strategy.

A recent visibility study contracted by EPA to Systems Applications Incorporated (SAI) indicates that significant perceptible improvements in visibility in the New England region would result from a 31 state, 12 million ton SO2 reduction, but that the greatest improvements would actually occur in the heavily emitting midwestern states. The SAI study further indicates that the economic benefits resulting from this kind of an improvement in visibility would be in the neighborhood of 2 billion dollars per year, a figure equivalent to approximately half the costs of the required SO2 control program.

The Agency's analysis of visibility impairment in Vermont has in recent years focused on the requirements of Section 169A of the Clean Air Act, which calls for state implementation plans to protect visibility in certain Class I Federal areas (including Vermont's Lye Brook Wilderness Area in Manchester and Sunderland).

EPA, in regulations developed under 169A, has effectively sidestepped the regional haze issue by dividing visibility protection into two phases. Phase I, to be addressed at the present time, deals with so-called "plume blight" (impairment readily traceable to individual sources). Phase II will address regional haze at some as yet unspecified future date.

Vermont's Visibility Protection Plan, which will be available in draft form within the next several months, will attempt to extend beyond EPA's limited requirements and directly address the regional haze problem as required by the Act. (See attached papers for additional detail).* Our logic goes something like this:

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* The papers referred to have been retained in committee files.

- The Act establishes as national goals the prevention of any future impairment and the remedying of any existing impairment of visibility in mandatory Class I Federal areas.

- The Act also requires that states make reasonable progress toward attaining these goals.

- We have determined that good visibility is important throughout the State of Vermont (not just Lye Brook), and we will designate a number of other areas in the State as "sensitive areas" for the purposes of visibility protection.

- We have conclusively determined that plume blight impairment does not occur in Lye book or in any designated sensitive area as the result of any source of air pollution located within the State of Vermont. We would therefore be lax in our mandated responsibility to make reasonable progress if we sat around and thought about plume blight for the next 10 years.

- We have determined that considerable impairment exists in Vermont as the result of emissions from beyond our borders.

* This impairment is not localized but occurs on a widespread regional basis, especially during summer, the season of concern for visibility protection in Vermont.

* The summertime impairment is dominated by sulfate particulate which, in combination with associated (absorbed) moisture, accounts for 85% of the variation of light extinction in Vermont during the summer. Non-sulfate particles which accounted for nearly 75% of the total particulate mass only accounted for 2% of the variation in light extinction.

* Vermont sulfate concentrations last summer were higher than they have been during any of the past 15 years. We certainly cannot suggest that any reasonable progress is occurring.

* We plan to set a State sulfate standard of 2 ug/m3 on a summer seasonal basis. this represents approximately a 50% reduction in existing concentrations, and while it will by no means remedy all existing visibility impairment, we believe this is what is necessary to make reasonable progress toward the goals set forth in the Act. We have seen

suggestions from EPA that a fine particulate standard might be an appropriate way of addressing regional haze. We feel that this would be an unnecessarily roundabout approach for the eastern United States. A sulfate standard would address the most effective light scattering species, and lead to simpler assessments and more effective control measures.

* Attainment of this standard requires sizeable SO2 reductions in upwind states, particularly in specific areas of the midwest best defined as the lower Great Lakes and Ohio River Valley.

* Our technical assessment of the specific origin of Vermont's summer sulfate is based on our own examination of the spatial and temporal characteristics of nearly 1,400 individual air trajectory calculations. We can strongly confirm these conclusions with the results of an entirely different assessment technique developed at the University of Rhode Island which relies on the ratios of various trace elements in the ambient aerosol. We are currently in the process of seeking a third assessment by a regional scale transport model recently developed at Massachusetts Institute of Technology from which we anticipate

additional confirmation.

- Although our technical analysis is incomplete at the present time, we believe it will be sufficient to demonstrate that a number of specific midwestern states located in EPA Regions III, IV, and V fit the Section 169A definition of "states the emissions from which may be reasonably anticipated to cause or contribute to impairment of visibility" in Vermont's Class I Lye Brook Wilderness Area. Under 169A, implementation plan revisions including emissions limitations, schedules of compliance and best available retrofit technology will be required in these states.

We could hardly hope that this visibility approach will ultimately succeed in achieving large scale emissions reductions where so many other attempts have failed. We do believe however that Section 169A contains some very strong language which may be effective depending upon how certain phases are ultimately defined. Because of our concern for the multiple effects of transported pollutants in Vermont, we feel its essential to at least try this section out and see how it works. If nothing else, we hope to learn more about the specific origins of acid rain through our studies of visibility, and to emphasize that acid rain and regional haze are a single problem with common origins and requiring common solutions.

ATTACHMENTS TO STATEMENT OF R. POIROT
BEFORE SENATOR ROBERT T. STAFFORD
Montpelier, VT., July 22, 1985

1. Cover to "Implementation Plan for the Protection of Visibility in the State of Vermont".
2. "Regional Apportionment of Ambient Sulfate Contributions to a Remote Site in Northern Vermont" A.P.C.A. International Specialty Conference on Receptor Modeling, Williamsburg, VA, March 1985.
3. "Visibility Protection in the Green Mountains: Elements of Plan Design" Annual Meeting A.P.C.A., Detroit, MI, June 1985.
4. "The Origin of Visibility Impairment in Vermont" Annual Meeting A.P.C.A., Detroit, MI, June 1985.

Note. The above cited attachments have been retained in committee files.

STATEMENT OF WALLACE McLEAN

My name is Wallace McLean. I am Chief of Monitoring and Surveillance for the Water Quality Division, Vermont Department of Water Resources and Environmental Engineering. I would like to thank you for inviting me here to present a summary of the Department's findings regarding the impact of acid rain on the State's surface water quality and aquatic ecosystems.

The Department initiated its first acid rain studies in late 1979 by examining twenty lakes. In 1982, the Department produced a state-wide sensitivity map. The basis for this map was an examination of the State's bedrock geology in terms of its buffering capacity. A copy of the Department's map is attached to my written testimony.* Upon examination of the map the following information becomes apparent:

a. The bedrock which forms the spine of the Green Mountain range has little or no buffering capacity.

b. Isolated, but significant pockets of granite bedrock in the central and northeast areas of the State have little or no buffering capacity.

c. Significant areas of the western foothills of the Green Mountain range have bedrock which has medium to low buffering capacity.

In summary, every major watershed in the State contains geologically sensitive areas.

When lake alkalinity data from Department studies are plotted on this sensitivity map, it becomes readily apparent that the map is a "good" general indicator of sensitive areas. In order to verify the sensitivity of a particular lake, it is necessary to collect actual water quality data since there are other factors that determine sensitivity besides bedrock type. I would like to state at this point that a recently released draft map from the U.S. Environmental Protection Agency depicting regions of similiar surface water alkalinity in the northeastern portion of the country, with respect to the Vermont portion of the map, is in close agreement with the map produced earlier by the Department. It is the opinion of the Department that the new map does not reveal any significant additional information about Vermont.

Since our initial studies in 1979, over 200 lakes have been studied and classified according to their sensitivity to acidification as measured by lake alkalinity. I have prepared a table which accompanies my written testimony which reflects this sensitivity classification/ranking of many Vermont lakes, exclusive of Lakes Champlain and Memphremagog. In summary, the table reflects the following findings:

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* Retained in committee files.

a. Six lakes are critically acidified meaning they have no available means of buffering against future acid inputs. These lakes represent collectively 108 surface acres or 0.2 percent of the State's lake surface water acreage.

b. Twenty-four lakes representing 2,303 surface areas, or 4.3 percent of the State's surface acreage were found to be extremely sensitive with alkalinity levels between 0 and 2.5 mg/l.

c. Thirty lakes are classified as sensitive with alkalinity levels found between 2.5 and 5 mg/l. This grouping of lakes encompasses 3,364 acres or 6.3 percent of the surface waters.

d. Forty-eight lakes have been classified as moderately sensitive with alkalinity levels of 2.5 to 12.5 mg/l. This grouping represents 5,471 acres or 10.3 percent.

In summary, 108 lakes representing 11,246 surface acres or 21.1 percent of the State's lake surface waters, exclusive of Lakes Champlain and Memphremagog, are likely to incur some quality degradation with continued acid deposition at the current levels.

The Department has selected thirty-six of the most acid sensitive lakes from its earlier studies to continue studying over an extended period of 10 years. This program has been made possible by funds granted to the Department by EPA in Corvallis, Oregon. Without these monitoring and surveillance funds, the Department would have had to suspend its acid rain studies. The primary purpose of this monitoring activity is to establish trends in measured chemical variables and biological populations.

Biological monitoring in the long-term study lakes has been initiated to evaluate fisheries, zooplankton, phytoplankton, and macroinvertebrate populations.

Fishery surveys revealed that two of the lakes, Haystack Pond in Wilmington (pH 4.6) and Little Pond in Woodford (pH 5.1) are fishless. It is highly probable that acidic conditions in these ponds are responsible for these lakes being unable to support fish populations. Existing smallmouth bass populations in several of the lakes are threatened. The pH levels in Grout Pond (Stratton), Sunset Lake (Marlboro), Hardwood Pond (Elmore) and Somerset Reservoir (Somerset) are near the critical level for smallmouth bass. Future inputs of acidic deposition could endanger the reproductive capability of these populations.

The studies also revealed that as the acidity increased the number of fish species present in a lake decreased for clear water lakes. Clear water lakes being those with low levels of dissolved organic material. Similar findings in clear water lakes were found for both zooplankton and phytoplankton populations in that increased acidity resulted in reduced number of species.

The sensitive components of the macroinvertebrate community further showed changes related to increased acidity. Sensitive species of crustaceans, mollusca, and mayflies were significantly reduced with increased acidity.

In 1983, the Department initiated stream monitoring in high order streams to evaluate seasonal variations in stream chemistry and biological community structure in an effort to ascertain potential impacts from acidic deposition.

Seasonal sampling of streams resulted in the following findings:

a. Stream alkalinity levels are reduced in all streams following increased stream flows resulting from snow melt and acidic precipitation.

b. High order streams, which are normally low in alkalinity, showed drastic decreases in pH following the loss of available alkalinity during periods of acidic precipitation and snowmelt.

c. High order streams often have increased dissolved aluminum levels which have been implicated in biological toxicity.

A majority of Vermont's major river watersheds have their headwaters in the extremely sensitive Green Mountains. Some major watersheds in Southern Vermont are almost totally underlain by bedrock formations which are slow weathering and do not contribute significantly to a watershed's buffering capacity. The West River watershed, where a major effort is currently underway to restore an anadromous Atlantic salmon population, is totally underlain by bedrock formations with essentially no buffering capacity.

Eighteen high-order streams in Vermont have been sampled in geologically sensitive areas of the state. Fish populations in high-order clear streams are generally not very diverse. A relationship of decreased community complexity with increasing acidity is implied by the data collected to date. It has also been shown in high-order Vermont streams that acid-sensitive components of the macroinvertebrate community, ie. crustaceans, mollusca, and mayflies, become less diverse under increasing acidic conditions.

Vermont's citizens are greatly interested in the subject of acid rain. Since 1980, the Department has sponsored an Acid Rain Lay Monitoring Program. The purpose of the program was to determine the range of and the temporal and spatial patterns in the pH of Vermont's precipitation. Currently, citizen volunteers operate eleven monitoring sites using equipment supplied by the Department. Annual data reports are published by the Department utilizing the information collected.

In addition to the Department supported Lay Monitoring Program, the Department also assists in monitoring efforts being undertaken by the Conservation Society of Southern Vermont to monitor the pH of precipitation and surface waters in southern Vermont. This monitoring effort is also supported in part by the University of Vermont, University of Massachusetts, and Dartmouth College. An additional monitoring effort supported in part by the Department has been the Lake Champlain Committee's volunteer program in the Lake Champlain Basin. It is obvious Vermonters are interested and concerned as evidenced by the time and effort put into this program.

SUMMARY

1. Every major watershed in the State contains geologically sensitive areas.

2. Six lakes in the State are presently critically acidified with two unable to support fish populatiuons. An additional 102 lakes are believed to be in jeopardy of becoming acidified if acid rain continues over an extended period of time.

3. The acid sensitive components of the biological community are significantly reduced in number with increased acidity.

4. High order streams, which are normally low in alkalinity, showed drastic decreases in pH following the loss of available alkalinity during periods of acidic precipitation and snowmelt.

5. Long-term monitoring efforts in Vermont are essential to understand the impacts of acid rain on the State's surface waters and their aquatic communities.

6. Continuation of Federal funding to support long-term monitoring/surveillance efforts is critical.

Classification of Vermont Lakes Based Upon Measured Alkalinity Levels

Classification	Alkalinity Criteria mg/l ueql/l	Number of Lakes	Area (acres)	%
Critically Acidic	<0	6	108	0.2
Extremely Sensitive	≥0, <2.5 (0,50)	24	2303	4.3
Sensitive	≥2.5, <5 (50,100)	30	3364	6.3
Moderately Sensitive	≥5.0, <12.5 (100,250)	48	5471	10.3
		108	11,246	21.1

Note: This represents the best estimates of the percent of the total lake surface acreage in Vermont exclusive of Lakes Champlain and Memphremagog. Not all lakes in Vermont have been tested for alkalinity at this time. Lakes not yet sampled have been tentatively classified as "not sensitive" for the purpose of determining the summary statistics shown above.

TESTIMONY OF RICHARD KLEIN
BEFORE THE UNITED STATES SENATE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

Montpelier, Vermont. 22 July 1985

Senator Stafford:

This is the fourth time I have presented information on forest decline in New England before your committee. At each hearing, my testimony has been increasingly pessimistic and I regret that this time I must be even more gloomy.

The acidic deposition project of the Botany Department, University of Vermont, codirected by me and Dr. H. W. Vogelmann, has conducted three complete surveys of the plants at all elevations on Camels Hump Mountain, a prominant peak in the Green Mountain chain. The first, in 1965, provided us with a quantitative base which is, although at least ten years after the advent of widely dispersed acidic deposition, the most comprehensive survey in North America. The western aspect of the Mountain - our field station - was resurveyed in 1979 and again in 1983. The data obtained has formed the foundation for intensive field and laboratory investigations on the causes of the decline in forest trees and other plants.

One need not have quantitative data to know that something very serious is happening to these and other forests. Simple visual inspection of the hardwood, transition and montane, boreal coniferous forest of the upper elevations above 800 meters demonstrates that the forests are experiencing a disaster of unprecedented severity. This is apparent in a selection of color slides. Not only trees, but also mosses and beneficial fungi (mycorrhizae) are reduced, and the natural decomposition processes of litter is affected. We have, in addition, set up a collaborative study with NASA and with the Jet Propulsion Laboratory of Pasadena, California to evaluate the potential of remote sensing for locating declining forests and assessing the degree of damage. False color and infrared photography has corroborated our ground-based findings and overflights have pinpointed areas in New England, not previously surveyed, that show that forest damage is widespread. When combined with reports from New York, New Hampshire, Maine and south through the Appalachian Mountain Chain to the Carolinas plus eastern Canadian Provinces, it is clear that forest decline is now a fact of life in eastern North America as it is in Europe. There is increasing, albeit incomplete, evidence that forests of the western states are beginning to be impacted as well.

A significant aspect of our work is an attempt to determine with precision the temporal relationships of tree decline both to obtain some measure of rates of decline and to see if it is possible to find the lawyer's "smoking gun." We are using techniques in which the number and width of tree rings are dated (dendrochronology) and are chemically analyzing specific time spans of wood. Mr. Scherbatskoy in our group has found that vanadium, a product of fossil fuel combusion normally absent from our soils, has accumulated in spruce and maple since the 1950's and that aluminum, a normally only slightly soluble indigenous metal in our soils, has been mobilized and has also accumulated in trees starting in the 1950's. These preliminary data do, we think, provide the base for homing in on the time that Vermont and upper New England began to become polluted.

Search for the cause or causes of the damage are occupying the attention of many scientists in many countries. As a base, we now have extensive meteorological datas showing that precipitations are 15 to 25 times more acidic than natural, that they contain toxic metals which are accumulating in soils and are being solubilized by acidic depositions; the soil water taken up by plants contains damaging levels of metals, including aluminum, cadmium, copper, lead and zinc. Calcium and magnesium, vitally important for plant growth are being leached down below the root zone. Nitrate from nitric acid is accumulating in the soil water as is sulfate from sulfuric acid. Gaseous, oxidizing pollutants - ozone and PAN - are damaging plants. Although we have been unable to secure funding for monitoring of these gases in Vermont, we have seen symptoms on trees that are typical of ozone damage.

Thus, we have quantitative evidence for severe forest damage and meteorological and monitoring evidence for a diverse range of anthropogenic pollutants. From a legislative perspective, it is important to evaluate whether there is a direct cause and effect relationship between these two sets of irrefutable facts. Put bluntly, this is an almost impossible task. I have indicated that acidity, toxic metals, at least three gaseous pollutants, depletion of nutrients, alterations in mycorrhizae, decreased nutrient cycling, accumulation of nitrate and sulfate and other deleterious changes are impacting the forests. When it is also recognized that all of these stresses interact, that the mix of stresses varies in time and in space, that weather patterns are inconstant and that there are species and even intraspecific genetic differences in affected plants, the possible interactions boggles the mind.

A considerable proportion of our energies are devoted to experiments in which we attempt to evaluate the effects of anthropogenic stresses on plants. We are necessarily restricted in these efforts. It is physically impossible to conduct studies that simultaneously include all of the potentially damaging stresses on even one of the number of tree species that we know has experienced decline. Not all of these pollution stresses are direct; damage to root systems by alterations in the soil environment affects the stem and leaves, and damage to leaves and needles is reflected in root health. The laboratory is not reality and we know that the sequence from initial injury through decline to death of a tree takes five to ten years. Nevertheless, we and a few other laboratories have accumulated a significant body of information that leads inexorably to the conclusion that anthropogenic pollutions - acid deposition, metals and probably gaseous pollutions - are the most probably causal complex of forest decline. We have experimental evidence that the observed decline in moss cover, the decrease in litter decomposition and nutrient cycling, the uptake of water by root systems, the activity of soil microorganisms, root damage, leaching of foliar nutrients and other processes are each affected by present conditions. Even assuming that these stress responses are additive and not synergistic (and they probably are interactive), there are more than sufficient numbers and amounts of pollution stress to account for the observed forest declines.

But I must again emphasize that proof, in the legal or even the scientific sense, that these pollution stresses are truly causal is not, nor will it ever be, adequate. We have a situation in which the probability that known and suspected anthropogenic pollutants are causal is very high - at least 70 percent and possibly up to 80 percent sure. Any prudent person will carry an umbrella when the probability of rain is 50 percent and will also wear a raincoat when the weatherperson tells you that the rain probability is 70 percent. Our nation has made profound decisions with much lower probabilities. And if projections of our data are correct, we haven't too much longer to make up our collective minds; 80 percent of the red spruce on Camels Hump are dead or dying, the species is not reproducing and other species, both conifers and hardwoods are declining.

I want to conclude my testimony with a matter that has not received the attention that it must receive. The primary emphasis in current legislative thinking is the vitally necessary reduction in the amounts of sulfur emitted into the atmosphere. However, even if the goal of a 50 percent reduction in SO_2 is achieved, there will be enough NO_x and thus nitric acid, and enough metal and gaseous pollution to maintain severe stress conditions on our forests. In spite of irresponsible statements to the contrary, the technology exists NOW to achieve reductions in sulfur, nitrogen, metals and gases that can relieve the impossibly severe stresses being experienced by our natural resources. Thank you

July 22, 1985: Testimony of Roberta R. Coffin, M.D., Commissioner of Health, at hearing held by the Environment and Public Works Committee of the United States Senate.

* * * * * * * * *

Senator Stafford, members of the Senate Environment and Public Works Committee, I appreciate the opportunity to talk with you about the important public health concerns of air toxics. Departments of Public Health are involved in complex and often controversial situations where environmental contaminants pose potential health hazards. Determining a proper course of action is hampered by a paucity of information on health effects and the lack of availability of standards for the majority of chemicals in commercial use in the United States. Yet without a standard or quantitative action level, the public health agency has only limited justification for intervention, further study or action.

In many situations, the rapid formation is required of a threshold for public health activities. Developing this level for a pollutant involves employment of a series of steps which includes utilization of existing information on toxicity and carcinogenisis, the experience of other public health agencies, transmutation of other related standards and a decision-making process. All this activity is duplicated many times by each of the state public health agencies when faced with a need for action. Many resources are utilized, there is duplication of effort, questionable experts and expertise is utilized and there is no uniformity of results. All this is because there is a lack of one over-riding guideline, policy, or standard which has been developed as a result of the best available scientific knowledge.

In 1982, the Vermont State Department of Health undertook a statewide surveillance project to determine the levels of volatile organic chemicals in 50 community water supplies. As a result of this monitoring, tetrachloroethlylene, trichloroethylene, and 1,2 dichlorethene were found in the community water supply well in Williamstown, Vermont. During this investigation, it was found that the only significant user of volatile organic chemicals in the community was an industrial uniform laundry and dry-cleaning plant located between and elementary school and a high school. The finding that this dry-cleaning plant had distilled fluids used in the cleaning process and disposed of the tetrachloroethylene containing sludge in holes on the hill outside the establishment looking over both schools, increased the concerns of the community. Testing showed contamination of drinking water, ground water, surface water and soil.

In addition to the water contamination problem, reports and observations of tetrachloroethylene-like odors were noted in the high school next to the plant. The known odor threshold for tetrachloroethylene is 5 to 50 parts per million. Instantaneous grab samples of the air taken on the high school and elementary school property showed up to 150 parts per billion of tetrachloroethylene when no odor was apparent. As a result of the findings of tetrachloroethylene contamination of the community water system, the private wells and in the ambient air near the plant, questions arose concerning possible health hazards especially for the children in the schools. There were demands from some of the parents that both schools be closed because of this potential risk.

After consideration of all available information and extensive discussions with a multidisciplinary group of Vermont public health professionals, an interim ambient air exposure level for tetrachloroethylene for evaluating the short-term air quality in and around Williamstown schools was developed. This level was then compared to estimated average daily intake calculations from all sources, including the water, for tetrachloroethylene.

This interim standard forms the basis of a health order requiring the plant to remain closed unless they could demonstrate concentrations of tetrachloroethylene at a lower concentration at the school boundary.

This standard provided an approach for the Department of Health toward the elimination of potential health risks based on analysis of existing information. But it did not produce concensus or remove controversy. It did, however, provide a basis for state action.

Formation of this type of interim standard is useful and may in cases be required in dealing with environmental contaminants even on a short-term basis. To this date, now almost two years later, the standard remains useful in this particular town. It is however, more appropriate that standards be developed at a national level by the leading experts in the country. When there are individual state or locally developed standards, state borders are not sufficient to divide and make reasonable the support of differing numbers or approaches to standards. This was amply demonstrated during last year's ethylene dibromide scare. Each state had a different number, EPA suggested a number and confusion reigned because the states did not agree the EPA's number was indeed low enough or arrived at rapidly enough.

It is difficult for states to answer the question which was always posed, "why is your number different or higher than your neighbor's number" or "why is your number lower than your neighbor's number?"

The costly process for each state to do the scientific calculations necessary to develop individual state standards for air pollutants is hard to justify.

Environmental standards are not always those which are agreed upon by a state's health department unless there is a cooperative working relationship such as we have in the State of Vermont.

The risk assessment for small populations is not justifiable scientifically when we're talking about low-level environmental exposures to many contaminants. In order to provide a great enough power in scientific calculation, a large denominator, especially to develop the carcinogenic risks, must be used which would encompass many more people than in one state, especially one the size of Vermont.

The Vermont Health Department had the unique opportunity to investigate the health effects of indoor air contamination, which is another area of air toxics which should be addressed at the same federal scientific level.

The indoor air of worker's homes in Poultney, Vermont was contaminated with levels of mercury which at times exceeded OSHA levels and certainly EPA ambient air standard levels. This was the result of workers bringing mercury home from its local thermometer manufacturing plant and the vaporization which took place subsequently from their clothes and the droplets of mercury which they carried home. The increased air levels in turn were inhaled over a lengthy period of time by worker's children, and the result was excessive mercury levels which were detected in 18 out of 23 children tested.

An approach to the solution of the many needed scientific studies to develop firm ambient air standards or standards for air toxics would be guidelines which could be used by states to establish local controls.

A process has begun in Vermont by the Agency of Environmental Conservation to develop air toxic regulations and guidelines. This effort is a cooperative one with the Department of Health. However, they are surely to be hotly debated as are all health effects standards proposed to prevent health effects of toxic emissions.

I appreciate the opportunity to present some of the problems which the Vermont Department of Health has faced with respect to air toxics in Vermont. The public has become increasingly sensitive to particular toxic effects on the sick, young, and old, as well as the healthy worker. The basis for the only current available standards, is the OSHA workplace standards. Greater knowledge of current levels of toxic air emissions under all types of atmospheric conditions will help form a basis for standard setting. Careful gathering of health effects data, including cancer and birth defects registeries, are important if we are to know the actual bottom line effect of air emissions on human beings.

NO. 53. AN ACT RELATING TO WATER RESOURCES BOARD JURISDICTION OVER GROUNDWATER AND TO ITS ABILITY TO RECLASSIFY STREAMS SUBJECT TO CONDITIONS.

(S.11)

It is hereby enacted by the General Assembly of the State of Vermont:

Sec. 1. 10 V.S.A. chapter 48 is added to read:

CHAPTER 48. GROUNDWATER PROTECTION

Subchapter 1. Policy; Definitions

§ 1390. POLICY

It is the policy of the state of Vermont that it shall protect its groundwater resources to maintain high quality drinking water and shall manage its groundwater resources to minimize the risks of groundwater quality deterioration by limiting human activities that present unreasonable risks to the use classifications of groundwater in the vicinities of such activities while balancing the state's groundwater policy with the need to maintain and promote a healthy and prosperous agricultural community.

§ 1391. DEFINITIONS

(a) "Agency" means the agency of environmental conservation.

(b) "Aquifer" means a water bearing stratum of permeable rock, sand, gravel or other alluvial soils.

(c) "Beneficial uses" means those uses included in each groundwater class.

(d) "Groundwater" means water below the land surface, but does not include surface waters within the meaning of 10 V.S.A. § 1251(13).

(e) "Public water supply" means a water supply system with ten or more connections.

(f) "Secretary" means the secretary of the agency of environmental conservation or the secretary's designated representative.

(g) "Technical criteria" means the numerical parameters or scientific parameters which, when followed, will result in groundwater suitable for the uses defined in its class.

Subchapter 2. General

§ 1392. DUTIES; POWERS OF SECRETARY

(a) The secretary shall develop a comprehensive groundwater management program to protect the quality of groundwater resources by:

(1) developing a strategy for the management and protection of the state's groundwater resources;

(2) continuing studies and investigations of groundwater in the state;

(3) cooperating with other government agencies in collecting and compiling data on the quantity and quality of groundwater and location of aquifers;

(4) identifying and mapping groundwater currently used as public water supply sources and groundwater determined by the secretary as potential future public water supply sources;

(5) providing technical assistance to municipal officials and other public bodies in the development of regional or municipal plans or bylaws, the purpose of which is the protection of groundwater resources;

(6) classifying groundwater resources according to the provisions of this chapter and adopting technical criteria and standards for the management of activities that may pose a risk to their beneficial uses;

(7) integrating the groundwater management strategy with other regulatory programs administered by the secretary;

(8) developing public information and education materials; and

(9) cooperating with federal agencies in the development of programs for protecting the quality and quantity of the groundwater resources.

(b) The secretary is authorized to accept and administer grants for groundwater management purposes in accord with the administrative procedures of the state.

(c) The secretary shall establish a groundwater coordinating committee, with representation from the departments of agriculture, forests, parks and recreation, and health to provide advice in the development of the program and its implementation. In carrying out his or her duties under this subchapter the secretary shall give due consideration to the recommendations of the groundwater coordinating committee. The secretary may request representatives of other agencies and the private sector to serve on the groundwater coordinating committee.

(d) The groundwater management strategy, including groundwater classification and associated technical criteria and standards, shall be adopted as a rule in accordance with the provisions of 3 V.S.A., chapter 25. The secretary shall file any final proposed rules regarding the groundwater management strategy, with the water resources board not less than 30 days prior to filing with the legislative committee on administrative rules. The board shall review the final proposed rules and comment regarding their compatibility with the Vermont water quality standards and the objectives of the Vermont Water Pollution Control Act. The secretary shall include the water resources board's comments in filing the final proposed rules with the legislative committee on administrative rules.

(e) Annually, the secretary shall report on the program to the natural resources and agriculture committees of the general assembly.

§ 1393. COORDINATION

Nothing in this subchapter is intended to interfere with authority granted other agencies of state government by statute. The secretary will coordinate the development of the program with other state agencies as necessary.

§ 1394. CLASSIFICATION OF GROUNDWATER

(a) The state adopts, for purposes of classifying its groundwater, the following classes and definitions thereof:

Class I. Suitable for public water supply. Character uniformly excellent. No exposure to activities which pose a risk to its current or potential use as a public water supply.

Class II. Suitable for public water supply. Character uniformly excellent but exposed to activities which may pose a risk to its current or potential use as a public water supply.

Class III. Suitable as a source of water for individual domestic water supply, irrigation, agricultural use and general industrial and commercial use.

Class IV. Not suitable as a source of potable water but suitable for some agricultural, industrial and commercial use.

(b) All groundwater of the state is hereby classified as Class III water unless reclassified by the secretary.

(c) Any hearing on a classification or reclassification shall be held in a location convenient to the users or potential users of the groundwater which is the subject of the hearing.

(d) Class I or II classification shall apply to aquifers in use as a public water supply source or which in the opinion of the secretary have a high probability for such use.

(e) In determining the appropriate classification of groundwater, the secretary shall consider:

(1) its use or potential future use as a public water supply source;

(2) the extent of activity which poses a risk to the groundwater;

(3) its current water quality;

(4) its availability in quantities needed for beneficial use;

(5) the consequences of its potential contamination and the availability of alternate sources of water; and

(6) the classification of adjacent surface waters; and other factors relevant to determine the maximum beneficial use of the aquifer.

(f) It is the policy of the state to protect permanently Class I aquifers. The secretary pursuant to subsection (h) of this section shall establish by rule activities which pose risks to Class I aquifers and which activities shall be prohibited in Class I aquifers. Any classification of Class I waters involving privately owned lands or reclassification of Class I waters by the secretary shall become effective only when approved by act of the general assembly.

(g) The secretary's classifications shall be presumed correct if, in establishing the geographical limits of each class of groundwater, he or she uses generally accepted methods of determining aquifers based on existing knowledge of surficial and bedrock geology and available hydrological data.

(h) The secretary by rule may establish technical criteria and standards to define the classes of groundwater and manage activities that may pose risks to groundwater classes. The criteria and standards shall include the identification of activities which constitute risks to the groundwater and which may be precluded. In adopting criteria and standards, the secretary shall consider:

(1) drinking water standards adopted by the department of health and United States Environmental Protection Agency;

(2) the nature and quantity of groundwater at risk;

(3) the availability, cost and effectiveness of measures to mitigate risks;

(4) the nature and quantity of risks that activities may generate;

(5) the expense and effectiveness of correcting the damage the risks may cause;

(6) the consequences to the public interest should damage occur and be irremediable;

(7) the economic, social and environmental value of existing activities;

(8) the surface water quality standards including the classification of surface waters; and

(9) other factors relevant to designating appropriate groundwater classes or managing risks to groundwater quality.

(i) The secretary shall not promulgate criteria and standards to manage activities that restrict agricultural activities or those activities under the jurisdiction of the commissioner of agriculture without the commissioner's consent. Nor shall the secretary promulgate criteria and standards that restrict forestry management activities without consultation with the commissioner of forests, parks and recreation.

Sec. 2. 10 V.S.A. chapter 151 (licensing of water well drillers) shall be recodified as subchapter 3 of chapter 48, including renumbering of its sections as appropriate.

Sec. 3. REPEAL

10 V.S.A. §§ 1278 (groundwater resources policy) and 1279 (groundwater resources planning) are repealed.

Approved: May 15, 1985

CSSV
Conservation Society
of Southern Vermont
RR #1, BOX 1540 • NEWFANE, VT. 05345 • (802) 348-6334

TO: Ray Post, Senator Stafford, Members of CEPW
FROM: Vivian Kellogg, Director, CSSV
SUBJECT: Acid Rain Abatement
TITLE: Testimony for Committee on Environment & Public Works (CEPW)
DATE: August 1, 1985

Dear Senator Stafford and Members of CEPW:

It is a pleasure to submit written testimony to your committee headed by our esteemed Senator from Vermont.

Since July of 1984, the Conservation Society of Southern Vermont has been conducting citizen action projects to determine the effects acid rain is having on our state. One hundred volunteers are collecting precipitation, testing for pH, and submitting their data to Dartmouth College for computation into map form (see enclosure). Additionally, beginning April 1985, 130 volunteers are collecting stream samples once each month for pH, alkalinity, and anion/cation analyses in laboratories. Our projects are supported by the Vermont Agency of Environmental Conservation, the University of Vermont, Dartmouth College, and the University of Massachusetts.

The purpose of this testimony is not to outline the results of our study, as these results simply repeat the warning that Vermont's precipitation is acidic and Vermont's vulnerable streams in danger of acidification. Rather, I want to bring to your attention the people involved, their dedication, their concern, their frustration.

These 230 people are solid citizens ranging in age from high school students to retired folks. All of them began their work determined to take part in a united effort the result of which would be acid rain controls.

All of them are concerned because their results show consistently acidic precipitation. Year after year the evidence piles up, the environmental quality declines, and the Reagan administration blocks all effort to help us keep out-of-state pollution out of Vermont.

That countless others in our state are concerned by the problem is apparent from the cards, letters and financial support which come to CSSV for citizen acid rain projects. I submit for your review some letters received from these concerned citizens.

Vermonters, being a frugal sort, urge the Committee to make national energy conservation a primary component of the Acid Rain Amendment. Conservation saves money, saves energy, creates jobs, reduces pollution and is cost-effective.

We encourage you to implement conservation incentives with appropriate technology to reduce emissions at the source.

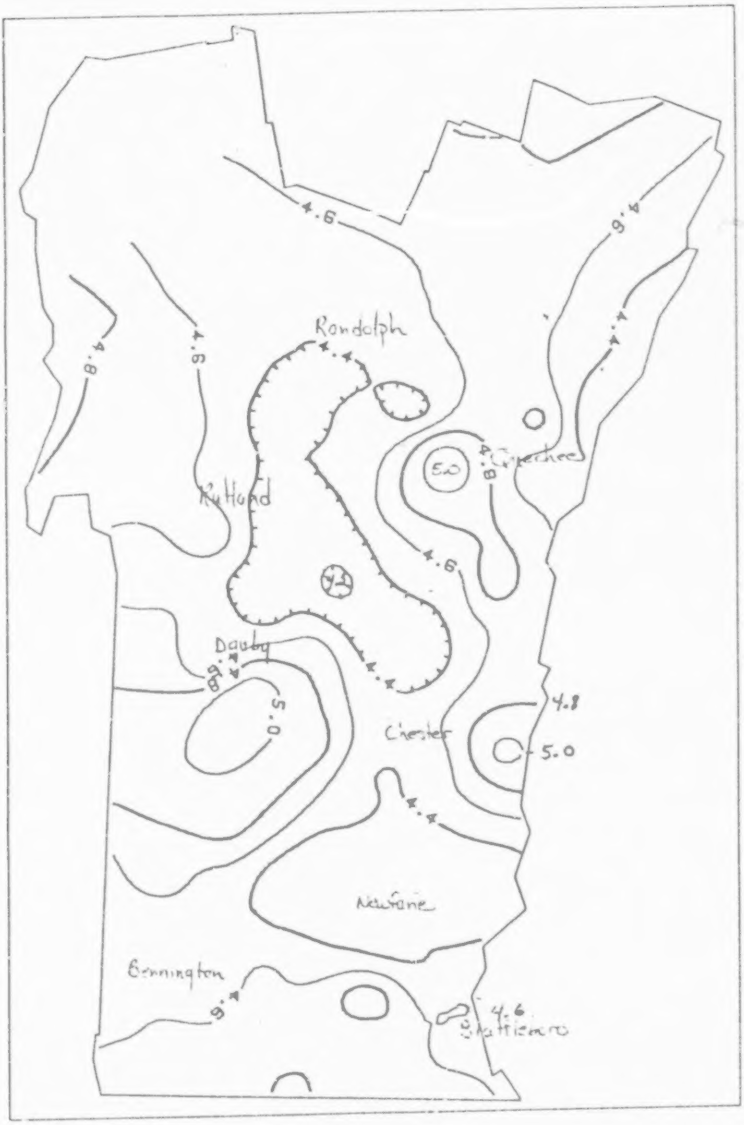
We urge you to find an equitable solution to pay for these reductions, perhaps through fines on those not reducing energy usage, and higher rates for "energy abusers." Give the utility polluters and their consumers the option of saving energy or spending money for cleanup.

Finally, we believe more should be done to educate the Midwestern people that their health and environment are not exempt from the destructive effects of sulphur air pollution.

Your consideration of these urgent concerns is very much appreciated. We applaud Senator Stafford's efforts to collect this testimony from the people pressing for resolution of this unjust pollution.

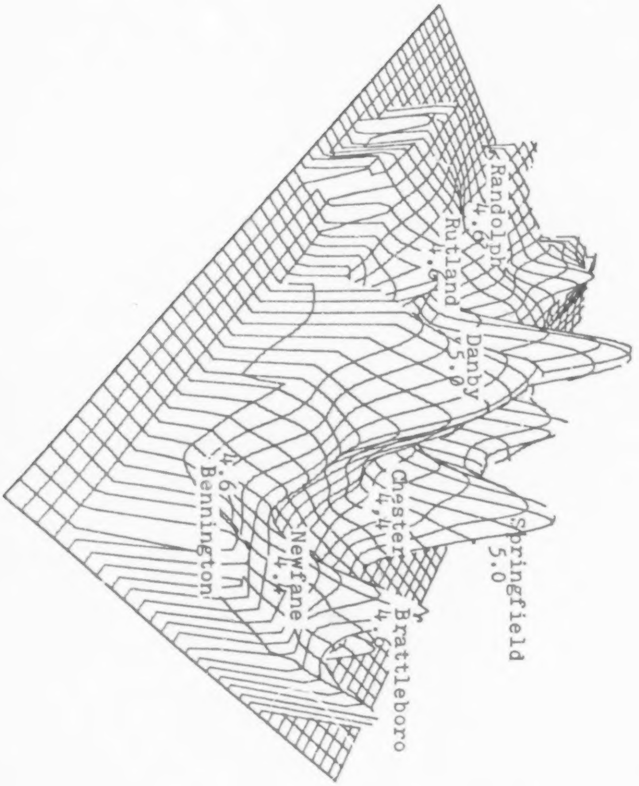
VK:sh
enclosures

MEAN PH LEVELS: MONTHS OF JULY THROUGH OCTOBER, 1984
PLOT NO. 1 DATE 05/28/85 TIME 21:27:45



MEAN PH LEVELS: MONTHS OF JULY THROUGH OCTOBER, 1984
PLOT NO. 1 DATE 05/28/85 TIME 21:41:05
AZIM = 45.0 ELEV = 50.0 DIST = 5000

Lowest mean pH, 4.2 - 4.4 indicated by trough in central mountains.
Highest mean pH, 5.0 and higher on western and eastern border.



Vermont Law School
P.O. Box 96, Chelsea St.
South Royalton, Vermont 05068
Telephone: 802/763-8303

July 24, 1985

Senator Robert Stafford
5219 Dirksen Office Building
Washington, D.C. 20510

Dear Senator Stafford,

Recently you held a hearing in Vermont on several environmental issues including groundwater. Our faculty was not asked to testify. However, I thought it would be appropriate to send to you and your staff copies of Professor Stephen Dycus's article on groundwater policy. Professor Dycus is a faculty member at Vermont Law School and is active in our Environmental Law Center. He has been teaching and studying water law issues for several years. I'm sure that he would be delighted to help your staff regarding these issues.

Cordially,

Richard O. Brooks
Director
Environmental Law Center

Enclosure
ROB:lfs

BOSTON COLLEGE

ENVIRONMENTAL AFFAIRS LAW REVIEW

DEVELOPMENT OF A NATIONAL GROUNDWATER PROTECTION POLICY	*DYCUS*
WOOD STOVES CAN WE SOLVE THE EMISSIONS PROBLEM BEFORE IT GOES UP IN SMOKE?	*ROPER*
THE DILEMMA OF THE DOWNSTREAM STATE THE UNTIMELY DEMISE OF FEDERAL COMMON LAW NUISANCE	*COLLINS*
THE PREPARATION OF AN ENVIRONMENTAL OPINION LETTER A PRACTITIONER'S GUIDE	*HOLMES*
BOOK REVIEW	*MINGST*

1984
VOLUME 11 NUMBER 2

DEVELOPMENT OF A NATIONAL GROUNDWATER PROTECTION POLICY

*J. Stephen Dycus**

I. INTRODUCTION

We live in a throw-away society. Our economy and life style have come to depend upon our ability to throw things "away." Whatever we do not want — candy wrappers, wide neckties, rusty cars, toxic chemical wastes — all of it is taken away to the dump or flushed away down the drain.[1] It now comes as a shock to most of us to learn that there is no "away,"[2] that we must continue to live with the mess we make.

This growing realization has provoked massive efforts during the last decade to abate the pollution of the nation's air and waters. In the attempt to clean up our visible environment, however, we have largely ignored what we cannot see. In particular, the defilement of our groundwaters has not diminished, but has increased with the diversion of waste streams from air and surface waters to on-land or subsurface disposal.[3]

According to the Environmental Protection Agency, some 150 million metric tons of hazardous wastes were generated in the United

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* Professor, Vermont Law School. B.A., 1963, LL.B., 1965, Southern Methodist University; LL.M., Harvard University, 1976. The author is especially indebted to Professor Elisabeth A. Owens of Harvard University, who introduced him to this subject.

[1] "For fundamental and deeply rooted psychological reasons, as well as more mundane utilitarian considerations, it is characteristic of man to bury that which he fears and wishes to rid himself of." United States v. Price, 523 F. Supp. 1055, 1057 (1981).

[2] Meridith Wright, Esq., lecture at Vermont Law School, November 18, 1980.

[3] Ironically, the Environmental Protection Agency has sometimes encouraged this diversion. ENVIRONMENTAL PROTECTION AGENCY, PROPOSED GROUND WATER PROTECTION STRATEGY III-11 (1980) [hereinafter cited as the CARTER STRATEGY].

States in 1981.[4] This figure includes toxic chemicals, solvents, corrosive agents, and other regulated materials. About fifty-seven percent is disposed of by injecting it underground, sometimes above or into aquifers which supply drinking water.[5] Another thirty-eight percent is placed in pits, ponds, or lagoons of liquid standing on the surface.[6] Not included in these amounts are wastes from many smaller sources and wastes illegally disposed of. Also not included are materials which are not regulated, but which may pose real threats to human health or the environment. Besides industrial sources, leachate from municipal landfills, mining activities, individual septic tanks, buried storage tanks, agricultural applications, and road salt all contribute to the problem of groundwater contamination.[7]

The numbers are staggering. The potential impact on public health and the environment is equally impressive. More than one-half the nation's people depend on groundwater for their drinking water supplies.[8] Many of those underground supplies now are polluted, some with organic chemicals known to be carcinogenic, teratogenic or mutagenic, and a growing number of towns across the country are being forced to abandon their public wells.[9]

Several states have formulated strategies to deal with this threat.[10] Certainly the states have a critical role to play, both for practical administrative reasons and because the people who drink the water know the most about local needs and conditions. State and local efforts, however, have been hampered by a lack of reliable data and technical know-how, by political conflict, and by inadequate funding.[11] There is also fear that parochial interests have been permitted to jeopardize the public health. While groundwater *allocation* has long been regarded as the responsibility of the states, groundwater *pollution* is now recognized as a national problem demanding a national solution.

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[4] A national survey released in August, 1983, reveals that this figure is about four times the previously estimated total. [14 Current Developments] Env't Rep. (BNA) 715 (1983); Shabecoff, Hazardous Waste Exceeds Estimates, N.Y. Times, Aug. 31, 1983, at 1, col. 1.

[5] Shabecoff, *supra* note 4.

[6] *Id.* Results of earlier surveys may be found in Environmental Protection Agency, Planning Workshops to Develop Recommendations for a Ground Water Protection Strategy, Appendices III-13 (1980) [hereinafter cited as Workshops or Workshops, Appendices].

[7] Other groundwater pollution sources are described in Shifrin & Nolan, Groundwater Protection by Recharge Zone Management 6 (1981); Workshops, *supra* note 6, at II-2; Workshops, Appendices, *supra* note 6, at III, IV, X-3.

[8] "Over ten billion gallons a day provide the basic supply of drinking water for more than half our citizens. More than 90% of rural dwellers rely on groundwater, usually untreated from private wells, for domestic use." Memo from Groundwater Policy Group to EPA Administrator, March 5, 1982, at 3. The memo is reprinted at [13 Current Developments] Env't Rep. (BNA) 290 (1982).

[9] Carter Strategy, *supra* note 3, at III-5. The effects of different kinds of groundwater pollution are described in some detail in Environmental Defense Fund, Comments on EPA's Proposed Groundwater Protection Strategy 7-15 (1981).

[10] *See infra* text at note 69.

Congress addressed this problem directly in the 1972 amendments to the Federal Water Pollution Control Act.[12] That act contains a broad mandate to "restore and maintain the . . . integrity of the Nation's waters",[13] along with an ingenious regulatory mechanism which can be applied to both groundwaters and surface waters. The Safe Drinking Water Act of 1974,[14] the Resource Conservation and Recovery Act of 1976,[15] and other Congressional measures are all directed at the same problem. Yet, the Environmental Protection Agency has until recently deferred action under these statutes that would protect groundwaters[16]—delaying the promulgation of regulations, failing to appeal adverse judicial decisions, and generally ignoring the problem.

Late in 1980, at least partly because of publicity surrounding the Love Canal tragedy, the EPA proposed a national Ground Water Protection Strategy.[17] This "Carter Strategy" called for full implementation of existing federal laws, but relied principally upon the cooperation of state governments for installation and enforcement of protective mechanisms. That proposal has been abandoned by the EPA under the Reagan administration.[18] In its place, the Agency has developed a draft proposed Groundwater Policy (Reagan Policy).[19] The new proposal resembles the old one in several ways, most importantly in its reliance on the development of effective state rules and state enforcement. The new proposal also relies upon the adequacy of existing federal statutes and programs. It leaves entirely for state control any questions of groundwater supply, and it envisions the adoption of a classification or zoning scheme for groundwater.

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[11] *See infra* text at note 77.

[12] Pub. L. No. 92-500, 86 Stat. 816 (1972) (now amended and codified at 33 U.S.C. §§ 1251-1376 (1976 & Supp. V 1981)).

[13] 33 U.S.C. § 1251(a) (1976 & Supp. 1981).

[14] 42 U.S.C. §§ 300f-300j-10 (1976 & Supp. V 1981).

[15] 42 U.S.C. §§ 6901-6987 (1976 & Supp. V 1981).

[16] CARTER STRATEGY, *supra* note 3, at III-11.

[17] 45 Fed. Reg. 77,514 (1980).

[18] *See infra* note 41.

[19] A June 7, 1982 memorandum from EPA Administrator Anne M. Gorsuch to Regional Administrators and others orders the formulation of a new groundwater policy to be announced by September 30, 1982. An earlier memorandum from a Groundwater Policy Group appointed by Ms. Gorsuch, *see supra* note 8, describes "hypothetical policy assumptions" which strongly reflect the Carter Administration's Proposed Strategy. This correspondence is reproduced at [13 Current Developments] ENV'T REP. (BNA) 290 (1982). The latest widely available draft of the Reagan Policy, dated October 7, 1982, may be found at [13 Current Developments] ENV'T REP. (BNA) 907 (1982) [hereinafter cited as REAGAN POLICY]. This draft is referred to throughout the article.

It is not certain that the new draft policy ever will be formally proposed. Apparently reflecting a deep division of opinion within the Reagan administration, the draft was recently consigned for further study to an interagency committee on which the EPA is not even represented, and future implementation of the proposal is in doubt.[20] Yet the *proposal* represents *current* policy at the Agency. Its formal adoption would require little change in procedures already in place at EPA.

Recently, top officials at the EPA have been charged with misfeasance or plain corruption in implementing the nation's environmental laws, especially those affecting the pollution of groundwater.[21] Certainly, such behavior, if indicative of a lack of concern over the real threats posed to the nation's groundwater, might have affected the preparation of the draft proposal. The new EPA Administrator, William Ruckelshaus, has promised fundamental changes in the way the Agency conducts its business, so the statement of Agency policy could be materially altered before it is adopted. But because the current proposal reflects a fairly consistent response by EPA from the Agency's inception, any fundamental change in guiding policy or institutional attitude would be surprising.

The purpose of this article is to use the draft proposal as a convenient vehicle for the discussion of issues relating to the development of a wise groundwater policy. The stated goal of the proposed policy is "to safeguard the public health and sensitive environmental systems by protecting the quality of groundwater."[22] The mechanisms described in the proposal, however, and the premises upon which their use would be based, are flawed in various ways. Those flaws will be revealed in the following analysis of the proposal itself and of our accumulated experience with the EPA. This article will briefly examine the body of statutory authority which is available to EPA for the protection of groundwater, but which the Agency seems so reluctant to invoke. It will also discuss the proper roles of federal and state governments, and will consider an alternate strategy more likely to meet the stated goal. It will be argued that only an unwavering commitment to the protection of the nation's groundwater supplies, reflected in a consistent and comprehensive federal policy, will forestall the serious threat currently facing our supply of drinking and irrigation water.

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[20] *See infra* text and notes at notes 44-45.

[21] Some of the charges and their disposition are reviewed at [14 Current Developments] ENV'T REP. (BNA) 650 (1983).

[22] REAGAN POLICY, *supra* note 16, at 1.

II. EMERGENCE OF A FEDERAL POLICY ON GROUNDWATER PROTECTION

The federal government began to be conspicuously involved in efforts to protect groundwater in 1972, with the passage of amendments to the Federal Water Pollution Control Act.[23] Groundwater provisions in those amendments reflected a growing concern that the states had failed to meet the challenge to protect groundwater supplies, and that the problem had become national in scope.[24] Unfortunately, the applicability of that act's regulatory mechanisms to groundwater was, and remains, somewhat unclear.[25] There is no doubt, however, that provisions of the Safe Drinking Water Act of 1974,[26] the Toxic Substances Control Act[27] and Resource Conservation and Recovery Act of 1976,[28] and the Superfund legislation in 1980[29] were intended to establish federal control over certain aspects of the problem.

These statutory authorities, however, are poorly coordinated and do not deal with every aspect of the problem.[30] At least as far back as 1974, the EPA addressed the lack of groundwater protection provided by its National Pollution Discharge Elimination System (NPDES) program, resolving instead to provide states with the maximum incentive to develop their own groundwater regulatory programs.[31] It was not until just before the discoveries at Love Canal, however, that a movement began at EPA to develop a strong, coordinated federal strategy to deal with groundwater pollution. In the summer of 1980, EPA sponsored two workshops for some eighty government officials, industrialists, environmentalists, and others with expertise in the field to recommend preferred strategies.[32] Their views were said to be reflected in the EPA's Proposed Groundwater Protection Strategy (Carter Strategy) published several months later.[33]

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[23] Pub. L. No. 92-500, 86 Stat. 816 (1972) (now amended and codified at 33 U.S.C. §§ 1251-1376 (1976 & Supp. V 1981)).

[24] For example, while it is declared in § 101(b) to be "the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution," the Administrator of the EPA is instructed to "prepare or develop comprehensive programs for preventing, reducing, or eliminating the pollution of the navigable waters and groundwaters." § 102(a), 33 U.S.C. § 1252(a) (1976).

[25] The response of the National Water Commission to this uncertainty was immediate and direct: "Federal legislation on control of surface water pollution should be expanded to include groundwater pollution, and the regulatory regime and enforcement techniques at the Federal level should be the same for both surface and groundwater." NATIONAL WATER COMMISSION, WATER POLICIES FOR THE FUTURE 244 (1973).

[26] 42 U.S.C. §§ 300f-300j-10 (1976 & Supp. V 1981).

[27] 15 U.S.C. §§ 2601-2629 (1982).

[28] 42 U.S.C. §§ 6901-6987 (1976 & Supp. V 1981).

[29] 42 U.S.C. §§ 9601-9657 (1976 & Supp. V 1981); 26 U.S.C. §§ 4611-4682 (1976 & Supp. V 1981).

[30] The statutes are examined *infra* text at notes 178-372.

The purpose of the Carter Strategy was to provide a framework for tying together regulatory efforts under various statutory authorities, and to furnish a policy basis for future decisions.[34] It recognized that coordination of efforts at all levels of government is essential, but it would have relied entirely upon the initiatives of the various states to develop and enforce their own groundwater protection programs.[35] States would have been encouraged, but not required, to classify aquifers within each state based upon current and future uses, and based upon federal groundwater quality standards.[36] Federal standards also would have prescribed technical requirements for activities on overlying lands.[37] Federal funding for state programs would have been conditioned on state compliance with annual agreements calling for conformity to the federal standards.[38] It was hoped that such a procedure would provide a generally uniform response, but with enough flexibility to tailor actions to state and local conditions.[39] The Carter Strategy recognized that questions of groundwater quantity and quality are inextricably linked, and that groundwater management efforts must be coordinated with surface water quality programs.[40]

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[31] Environmental Protection Agency, Water Quality Strategy Paper (1974).

[32] Carter Strategy, *supra* note 3, at II-1-17; Workshops, *supra* note 6. The workshop participants are listed in Workshops, *supra* note 6, at IV-IX. Workshop participants were furnished with background materials compiled by the EPA to acquaint them with physical problems of groundwater pollution, with issues surrounding its management, and with possible solutions. These documents provide valuable insights into EPA policies, practices, and priorities. They also reveal much about the EPA's perception of its authority under existing legislation, and about the political forces which help to shape its decisions.

[33] "The strategy which is proposed . . . reflects in general terms, the recommendations of the eight work groups [into which the workshops were divided]." Carter Strategy, *supra* note 3, at II-4. The groups were said to have presented "similar statements" of what should be the strategy's goal and the management approach needed to move toward this goal. Apparently, however, no consensus could be reached concerning technical requirements or federal/state roles. It is not clear just how influential the workshop recommendations were in the formulation of the EPA's proposals.

[34] Carter Strategy, *supra* note 3, at I-4.

[35] *Id.* at VII-1.

[36] *Id.* at VII-4-10.

[37] *Id.* at VII-7, 8; VII-2, 3.

[38] *Id.* at VII-2.

Although not expressly authorized by any statute, the proposed Strategy was responsive to broad policy mandates in each of the statutes mentioned earlier. It also provided a highly visible reaction to a widely recognized national crisis. Still, the Strategy failed to demonstrate a serious institutional commitment by the EPA to avoid the destruction of the nation's groundwater supplies.

The Carter Strategy was abandoned by the new EPA administrator,[41] and in 1982 a Groundwater Policy Group, consisting of senior Agency managers, was appointed to develop a new federal policy.[42] The result is a proposed Groundwater Policy (Reagan Policy) still in draft form, prepared by the EPA's Office of Water under the supervision of the Groundwater Policy Group.[43] In December 1982, the EPA proposal was sent for review to the Cabinet Committee on Natural Resources and the Environment, chaired by Interior Secretary Watt,[44] and its future at this writing is uncertain.[45] Although there apparently have been some revisions to the draft during the last few months, the most important points of the policy have not changed, according to several EPA staff members.

III. THE REAGAN EPA GROUNDWATER POLICY.

Despite the current Administration's disavowal of the proposed Carter Strategy, its own proposal, though much briefer, bears a strong resemblance to it. Indeed, the Groundwater Policy Group responsible for its drafting was directed to use as its starting point the consensus reached in public meetings in 1980.[46] The policy apparently is to be developed in two phases, the first dealing with a statement of general goals and premises, the second with implementation of the policy.[47]

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[39] *Id.* at VI-1.

[40] *Id.* at V-1. No mechanism, however, is offered to control withdrawals of groundwater or to integrate controls of ground and surface water pollution.

[41] A chronicle of the Reagan EPA's inaction on the Carter Strategy may be found at [12 Current Developments] ENV'T REP. (BNA) 69, 605, 797, 845, 1714 (1981-1982).

[42] *See supra* note 19.

[43] *Id.*

[44] [13 Current Developments] ENV'T REP. (BNA) 1577 (1983).

[45] This was the view of an EPA employee at the Office of Water, reported during a telephone interview on Feb. 23, 1983. *See also* Peterson, Watt Said to Block New Policy for Water Supply Safeguards, Washington Post, Feb. 18, 1983, at A4, col. 1. EPA Administrator Ruckelshaus has hinted that he favors adoption of a national groundwater policy. His interaction with former Secretary Watt on this issue is suggested in testimony before the House Government Operations Subcommittee on Environment, Energy, and Natural Resources on June 29, 1983, reported in [14 Current Developments] ENV'T REP. (BNA) 373 (1983).

The tone of the policy is set by the statement, "EPA commits its best efforts to turn existing statutory programs to the support of *States* as *they* protect our Nation's groundwater."[48] Although the draft available for review sets forth seven "operating principles" and a variety of "policy elements," it will be convenient to think of the proposed policy as being founded upon just five major premises:

A. State and local governments should have the lead role in managing and protecting groundwater.[49]
B. The proper federal role is 1) to coordinate and implement existing federal programs and 2) to encourage voluntary state and local program development.[50]
C. The regulation of water use and water rights and allocations are within the exclusive province of the states.[51]
D. The level of groundwater quality protection should be based upon current and projected uses of the water, *i.e.*, groundwater sources are to be classified or zoned.[52]
E. Existing statutory programs will enable us to meet groundwater protection goals.[53]

For a variety of reasons, the implementation of a policy based on these premises is not likely to protect either the public health or a wider environment.

It is not surprising that the proposed policy closely resembles current policy, and that the proposal for public review amounts to a request for approval of ongoing Agency practices.[54] Unfortunately, as the following discussion demonstrates, these current practices have not always provided even the minimum level of environmental protection mandated by Congress. The proposed policy is in reality a policy which already has failed.

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[46] *See supra* note 19.

[47] Memorandum of Assistant Administrator for Water Eric Eidsness dated July 23, 1982, reported in [13 Current Developments] ENV'T REP. (BNA) 470 (1982).

[48] REAGAN POLICY, *supra* note 19, at I. (emphasis added).

[49] REAGAN POLICY, *supra* note 19, at I, III.1., IV.

[50] *Id.* at I., III.1., IV.

[51] *Id.* at III.7.

[52] *Id.* at II., IV.

[53] *Id.* at I., III.2.

[54] One EPA insider has reportedly dismissed the draft policy as largely unimportant. It "doesn't commit a lot of resources, doesn't make anyone do much of anything, and doesn't give the states anything." [13 Current Developments] ENV'T REP. (BNA) 1800 (1983). The same report reflects sharp disagreement within the Reagan Administration over the contents of the proposal.

What follows is an examination of each of the five premises set out above, and an evaluation of each premise, relying on an understanding of EPA performance during four presidential administrations. In the process, detailed elements of the proposed policy itself will be described.

A. *State and Local Governments Should Have the Lead Role in Protecting Groundwater.*[55]

A major tenet of the Reagan Administration's philosophy, embodied in the term "the new federalism," is that the states and local governments ought to look out for themselves, with a minimum of federal government interference.[56] Reflecting this philosophy, the proposed policy suggests that groundwater protection is primarily the responsibility of the states.[57] Of course, the states already possess broad public health and police powers, and the states historically have made decisions about land use and water rights allocations. Decentralization of this function is appropriate, too, according to the policy, because of the diversity of groundwater conditions from state to state. Implementation of the EPA policy by the respective states would be entirely voluntary. Moreover, states would be given maximum flexibility in implementing delegated programs.[58]

It is now well settled that Congress has the power under the Commerce Clause to require compliance by states and individuals with federal rules for environmental protection.[59] There is some doubt, however, about the extent to which Congress has exercised that power to control groundwater pollution. In several statutes, Congress has provided that federal regulators must defer to states with programs at least as stringent as federal programs. The NPDES program in the Clean Water Act[60] is typical in requiring delegation of regulatory authority to the states under such circumstances.

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[55] REAGAN POLICY, *supra* note 19, at I., III.1., IV.

[56] *See The New Federalism in Environmental Law: Taking Stock*, 12 ENVT'L. L. REP. (ENVT'L. L. INST.) 15,065 (1982).

[57] REAGAN POLICY, *supra* note 19, at III.1.

[58] The Carter Strategy was similar in proposing that states be left with the "key responsibilities for designing and implementing programs." CARTER STRATEGY *supra* note 3, at II-7. The EPA, however, would have formulated and issued "guidance" for state strategies, and would have "encouraged" their adoption by incorporating them into annual State/EPA Agreements. *Id.* at VII-2.

[59] *See, e.g.*, Hodel v. Virginia Surface Mining and Reclamation Ass'n, 452 U.S. 264, 282 (1981). The same decision also tacitly disposes of Tenth Amendment challenges to various federal environmental laws. *Id.* at 289.

In those acts requiring delegation, however, as well as in others which by their silence leave some authority to the states, there is considerable latitude for the agency charged with implementing each act to say how stringent the federal standards should be.[61] The need for federal intervention depends not only on the effect of groundwater pollution on federal interests; it depends also upon the success of the states and local governments in controlling such pollution on their own initiatives. It is to the EPA's choice of standards that the proposed policy is chiefly addressed.[62]

There may be valid reasons for leaving control over groundwater pollution to the states. If the pollution of groundwaters can be controlled by state enforcement of some minimum uniform federal standards, it should not matter that they are enforced by the states in a nonuniform way, taking into account local needs and conditions, or that the states impose more stringent standards.[63] There may even be some advantages to having the states assume the lead role. Because they are closer to the problem, local officials may be able to fashion more efficient solutions to accommodate peculiar local needs. Local officials are likely to be more politically accountable for their decisions, and to have greater credibility with local constituencies, especially if they are elected.

The interstate nature of the groundwater problem, however, which triggers Congress' Commerce Clause authority, requires an aggressive *federal* response at the agency level. The legislative history of the various federal statutes is replete with findings that groundwater pollution is a national problem demanding a national solution. Polluted groundwater migrates across state boundaries. It may affect travel and commerce by entering surface waters; or it may affect travellers, who have to drink it. Conflicting standards for groundwater quality may hamper interstate business[64] or may incite economically and socially disruptive industry migrations. They may also make the health of our nation's citizens dependent upon where they live. Simultaneously, the proliferation of varying local rules may impede the development of new technologies and practices which would be in the federal interest.[65]

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[60] The National Pollution Discharge Elimination System is described in Clean Water Act § 402, 33 U.S.C. § 1342 (1976 & Supp. V 1981).

[61] The Agency's exercise of such discretion is considered *infra* text and notes at notes 178-372.

[62] The draft proposal calls for creation of "relationships with other Federal agencies which have significant technical or groundwater protection responsibilities to foster coordinated policy development and implementation." The policy under consideration here, however, is a proposal designed to guide the EPA alone. Its implications for other agencies are suggested by its pre-publication review by the Cabinet Committee on Natural Resources and the Environment and by the controversy which apparently has prevented its reemergence from that committee. Peterson, *supra* note 45. For example, the Interior Department is said not to have a groundwater policy, although one is evolving around the theory that groundwater "is properly governed by state laws, except where Congress has legislated otherwise." *Id.* Both the Carter and Reagan proposals conclude that no new federal legislation is needed for the policy to be carried out.

[63] It is possible, of course, that a state could adopt standards so much more stringent than the federal ones that industries would be encouraged to stay away, thus burdening interstate commerce.

In addition, local decisionmakers may lack the experience and sophistication to develop and enforce programs which truly reflect even the *local* public interest.[66] They may be more susceptible to the influences of narrow and local interests, or, they simply may not have the perspective needed to consider long-term effects on health or the economy, or be sensitive to transboundary effects. Even where local officials have the wisdom and resolve to adopt sound programs, they may welcome the imposition of federal standards which, for reasons of local politics, they feel powerless to implement on their own initiative.

The proposed policy declares that its implementation "will depend significantly on each individual State's desire and ability to coordinate its own efforts. . . . States determine their own problems, approaches and resource priorities."[67] Indeed, many states already have done much on their own to protect groundwater resources.[68] Several have adopted state groundwater policy statements.[69] Some, by their examples, have even shaped federal policy.[70] Others have at least accepted responsibility for some federally mandated programs. State responses, however, have been far from uniform,[71] and the question remains whether the mandated programs are stringent enough to protect the public interest.

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[64] The Carter Strategy provided:

> Since it is important to have a reasonable degree of consistency nationwide . . ., EPA would take the lead in working with the states to develop a common system. This will facilitate cooperation in dealing with interstate issues and will provide a more understandable regulatory environment from state to state for business and individuals.

CARTER STRATEGY, *supra* note 3, at VII-8. Many industry officials have supported the development of uniform federal standards, fearing that "too much state autonomy over environmental issues could create a hodge-podge of conflicting standards that could hamper interstate business." Pasztor, Many States Complain About Having to Assume Environmental Programs From Federal Agencies, Wall St. Journal, Aug. 24, 1982, at 54, col. 1; F. Shafroth, Municipal Rights and Remedies With Regard to Prior Toxic Groundwater Contamination 34 (1982) (unpublished manuscript).

[65] Pasztor, *supra* note 64.

[66] The Carter Strategy observes that:

> Some problems affecting groundwater are so serious, complex or ubiquitous that national action is warranted. Cases in which national action may be most effective could include situations, for example, where chemical substances, contamination pathways, and treatment processes are extremely complex and widespread. . . .

CARTER STRATEGY, *supra* note 3, at VII-10.

[67] REAGAN POLICY, *supra* note 16, at IV.

While it is true that the states historically have exercised jurisdiction over groundwater disputes, neither common law nor local statutory rules regulating groundwater use have been particularly effective in preventing groundwater pollution.[72] Nor have the doctrines of nuisance or trespass provided effective protection.[73] Land use planning and zoning decisions have often been concerned more with the local tax base, jobs or aesthetics than with groundwater protection.[74] While states have long regulated some activities which threaten groundwater quality—for example, individual septic tanks, road salting, and land subdivision[75]—decisions by various state and local agencies affecting groundwater have usually been made without effective coordination among agencies.[76] Even those states with statutory authority for meaningful planning and protection have often lacked the necessary funding or know-how.[77] It is for these reasons that Congress has directed that uniform federal standards be established in this area.

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[68] *See, e.g.*, the New York water pollution control program, N.Y. Envt'l Conserv. L. §§ 17-0101 - 1907 (McKinney 1973 & Supp. 1983), which has regulated discharges of pollutants to groundwaters since 1971. Groundwater management and protection programs for each state are summarized in U.S. Water Resources Council, State of the States: Water Resources Planning and Management (1980) and U.S. Water Resources Council, State of the States: Water Resources Planning and Management — Groundwater Supplement (1981); Nat'l Conf. of State Legislatures, Hazardous Waste Management: A Survey of State Legislation 1982 (1982); Environmental Protection Agency, Surface Impoundments and Their Effects on Groundwater Quality in the United States—A Preliminary Survey (1978) [hereinafter cited as Surface Impoundments]; Workshops, *supra* note 5, at VIII.

[69] For example, Vermont adopted its Groundwater Protection Strategy, based in part on the proposed Carter Strategy, in October 1982. Several other states either have adopted or are considering such policy statements. Three years after its proposal by the New York Department of Environmental Conservation, however, the policy for that state is still in the discussion stage. Telephone interview with Dan Halton, Director, Bureau of Water Resources, New York Dept. of Env. Cons., Dec. 30, 1982.

[70] The EPA has apparently used Connecticut's aquifer classification scheme as a model for its own policy proposal. Telephone interview with Fred Banach, Principal Sanitary Engineer, Water Compliance Unit, Connecticut Dept. of Env. Protection, Dec. 30, 1982.

[71] *Supra* note 68.

[72] Although it is clear enough that when a water supply is polluted by A and claimant B is thereby deprived of its use, courts have often resisted application of allocation doctrines to pollution problems, prefering instead to rely on nuisance, trespass, or negligence law. For example, although the court in Rose v. Socony-Vacuum Corp., 54 R.I. 411, 173 A. 627 (1934), refused to apply the absolute ownership doctrine of groundwater allocation in Rhode Island, it found no liability for pollution of a water well absent negligence or lack of skill on the part of the polluter. It took that court almost half a century to reverse itself in Wood v. Picillo, 443 A.2d 1244 (R.I. 1982). In the later decision, however, Rose was regarded as having been based on nuisance doctrine. The authors of Rest. Second of Torts have insisted on treating problems of pollution and consumptive uses separately. *Compare* Restatement (Second) of Torts §§ 832, 849 *with* § 858. Many states now have permit systems to control withdrawals of groundwater, but few of them require consideration of the impact of such withdrawals on groundwater quality. For an examination of the Reagan Policy proposal to treat groundwater supply and groundwater pollution problems independently, see *infra* text at notes 127-52.

[73] The limited utility of these doctrines stems from the difficulty in tracing pollution to its source, or in the case of nuisance, in demonstrating that the polluter has acted unreasonably.

The proposed EPA policy, however, like the Agency's current practice, seems to contemplate a relaxation of many existing federal standards.[78] One state agency official remarked to the author that individual states will likely respond to more relaxed federal rules in one of three ways: 1) those with programs already more stringent than they need to be will not care; 2) others will find it hard to resist political pressures at home to loosen local rules; or 3) some will jump at the chance to attract new industry by adopting the least restrictive standards.[79] If current federal programs are not adequate to safeguard the public health, and they may not be, such a varied response by state regulators is cause for alarm. The second element of the Reagan Strategy, which limits the EPA's role to simply coordinating and encouraging state efforts, increases reason for concern.

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[74] Shifrin & Nolan, *supra* note 7, at 12.

[75] A more extensive catalog is set forth in E. Selig, An Overview of Laws Dealing With Groundwater, address to the National Water Well Ass'n, Atlanta, Ga. (Sept. 22, 1982).

[76] Carter Strategy, *supra* note 3, at III-13, 14.

[77] Surface Impoundments, *supra* note 68, at 144-48; *Special Report, Crisis in State Toxic Substances Management* [13 Current Developments] Env't Rep. (BNA) 795 (1982).

[78] *See, e.g.*, *infra* text and notes at notes 164-65, 218, 257-58.

[79] Telephone interview with Reginald P. LaRosa, Director of Environmental Engineering, Vermont Agency of Environment Conservation, December 30, 1982. For an example of the last response, California Governor Deukmejian recently announced plans to "reshape California's business climate and stimulate economic expansion and job creation." [13 Current Developments] Env't Rep. (BNA) 2223 (1983). These goals would be met by cutting back state regulations and speeding up environmental review processes for siting new business facilities. *Id.* *See* Northeast-Midwest Inst., Building a Water Policy Consensus: Key Issues for the Eighties 13 (Merkowitz ed., 1982). There is a fear among some state regulators that very aggressive state programs may actually be punished by the EPA. *See Special Report*, *supra* note 77.

B. The Proper Federal Rule is 1) to Coordinate and Implement Existing Federal Programs, and 2) to Encourage Voluntary State and Local Program Development.[80]

The EPA proposes to more effectively implement the federal statutory programs which it is required to administer, but it will leave to the states the primary responsibility for protection of groundwater. The EPA will encourage, but not require, the states to develop their own protective programs.[81] This means that in states which do not develop their own programs, federal programs will provide the only protection for groundwater.

1) Coordinating and Implementing Existing Federal Programs.[82]

The EPA administers a number of statutory programs which may affect groundwater quality, directly or only incidentally.[83] The Reagan Policy proposes using elements from each of these programs to build a "cohesive groundwater protection strategy."[84] The proposed policy would create new institutional links within the EPA and new relationships with other federal agencies, to facilitate a more efficient and consistent federal approach.[85] It also would develop specific guidelines or mechanisms for making more consistent EPA regulatory decisions that affect groundwater.[86]

If a wise federal policy can be articulated, it only makes sense for that policy to be observed throughout the federal government. In some instances, interagency coordination is required by statute. Thus, when the Secretary of the Interior adopts regulations under the Surface Mining Control and Reclamation Act relating to air or water quality standards, he or she must get the approval of the EPA Administrator.[87] In other cases, agencies have entered into cooperative agreements on their own initiative.[88] Otherwise, decisions affecting groundwater quality are made quite independently by a variety of federal agencies, in many cases without any consideration of groundwater impact.[89]

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[80] Reagan Policy, *supra* note 16, at I., III.3.-6., IV.

[81] *Id.* at IV.

[82] *Id.* at I., III.4.-6., IV.

[83] These are cataloged in Workshops, Appendices, *supra* note 6, at VII.

[84] Reagan Policy, *supra* note 19, at III.4.

[85] *Id.* at IV.

[86] *Id.*

[87] 30 U.S.C. § 1251 (1976 & Supp. V 1981).

[88] The draft policy cites the example of a USGS-EPA Coordinating Committee.

[89] For example, grants, loans or other assistance by the Economic Development Ad-

The draft policy does not reveal how other agencies would be encouraged or required to cooperate with the EPA. Nor is it clear which agency would be the lead agency in coordinating or enforcing the implementation of a unified federal policy.[90] One can imagine a policy which would be self-enforcing, like the Water Resources Council Principles and Standards for Planning,[91] and which would apply to all federal activities affecting groundwater. The current proposal, however, contains no such suggestion.

Within the EPA itself, we should expect close coordination of activities among the several regional offices and the national headquarters.[92] We might also expect the Agency to administer its various programs in a way that reflects some uniform agency policy. For this purpose the Agency proposes developing guidelines or mechanisms to cover such elements as:

> 1) The yield, quality, location of aquifer, vulnerability, and competing uses for groundwater to be protected;
> 2) Factors to consider in limiting groundwater contamination, including the nature of the contaminants, hydrogeological setting, use and potential human exposure;
> 3) Non-environmental factors to be considered, such as technical and administrative feasibility, cost, available alternatives, and other competing uses;
> 4) Level or type of monitoring needed to assure compliance with federal rules.[93]

But various federal statutes already set standards for some of these elements.[94] Other elements, such as cost, should not be allowed to influence some agency decisions.[95] In some cases the Agency, without ex-

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ministration under the Housing and Community Development Act of 1974 require no consideration of groundwater effects unless they constitute a "major Federal action" under NEPA, *infra* text at notes 354-55, or affect a sole source aquifer, *infra* text at note 273. *See* WATER RESOURCES COUNCIL, GROUNDWATER MANAGEMENT: DISCUSSION OF ISSUES IV-2 (1981).

[90] Assistant Administrator Eidsness has said that the EPA would not seek that role. [13 Current Developments] ENV'T REP. (BNA) 880 (1982).

[91] 18 C.F.R. § 711 (1982). The Principles and Standards require systematic consideration of economic, environmental and social impacts in all federal planning for the use of water and land resources. It calls for a cost-benefit analysis utilizing both monetary and non-monetary factors. *See also* President Carter's Water Policy Initiatives, 14 WEEKLY COMP. PRES. DOC. 1044 (June 6, 1978).

[92] The draft policy calls for creation of "institutional linkages at the headquarters and regional levels to enhance program and policy coordination in areas such as State delegations, regulations, research and data acquisition and storage." REAGAN POLICY, *supra* note 19, at IV.

[93] *Id.*

[94] For example, criteria for identification or listing of hazardous waste under RCRA § 3001(a), 42 U.S.C. § 6921 (1976 & Supp. V 1981), include "toxicity, persistence, and degradability in nature, potential for accumulation in tissue, and other related factors."

[95] For example, cost is not a criterion in RCRA § 3001(a), 42 U.S.C. § 6921 (1976 & Supp. V 1981).

press statutory authority, has already applied standards developed in one statutory program to other programs.[96] The draft policy does not specify how uniform standards would be developed.

The EPA earlier hoped to promote internal consistency and efficiency and ease the regulatory burden on industries with the adoption of its Consolidated Permitting regulations in 1979.[97] Under the regulations, only one application need be filed to satisfy the requirements of RCRA, the UIC program, NPDES, Clean Water Act Section 404, and the Clean Air Act PSD rules.[98] In addition to assembling the permitting rules in one book and easing the administrative burden for the EPA, this procedure offered the potential for integrating surface and groundwater strategies and systematically considering all the possible environmental impacts for each applicant.[99] The Agency, however, recently announced its intention to deconsolidate the permitting process.[100] Thus, although the EPA states as the second tenet of the Reagan Strategy that it will effect groundwater policies in part through coordinating existing programs, it may in fact be moving away from that role.

Further, no amount of program coordination would do the job unless each individual program were fully implemented. Although the draft policy calls groundwater quality protection a "unifying goal linking all relevant EPA program activities,"[101] the Agency has hardly tested the limits of its authority under any of the federal environmental statutes. Within the range of its discretion under these statutes, it now seems determined to do as little as possible, either through direct regulation or by imposing minimum federal standards upon the states.[102] In view of this history, the Agency's proposal to coordinate and implement existing programs is hardly reassuring.

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[96] For example, Primary Drinking Water Standards promulgated under the Safe Drinking Water Act have been used as groundwater quality standards in regulations for the UIC program, *infra*, text at notes 266-71, and the RCRA hazardous waste program, *infra*, text at note 345.

[97] 44 Fed. Reg. 34,244 (1979). *See* Comment, *EPA's Consolidated Permitting Regulations: Miracle or Mirage?*, 10 ENVTL. REP. (ENVTL. L. INST.) 10,092 (1980). Consolidated permitting is not expressly mandated in any of the statutes, but is said to be authorized by provisions like Clean Water Act § 501(a) ("prescribe such regulations as are necessary") and § 101(f) ("encourage the drastic minimization of paperwork" and "prevent needless duplication"). 40 C.F.R. § 122.1(d) (1982).

[98] The rules are collected at 40 C.F.R. §§ 122-124 (1982).

[99] It could, for example, provide some coordination between surface and groundwater protection programs. As things now stand, the fact that a surface stream recharges an aquifer which supplies drinking water will not be considered in issuing an NPDES permit for discharge into the stream. WORKSHOPS, *supra* note 6, at VI-4.

[100] 48 Fed. Reg. 14,146 (1983). Grouping of permit requirements in this fashion is said to make completion of applications unnecessarily difficult and complex.

[101] REAGAN POLICY, *supra* note 19, at III.4.

2) Encouraging Voluntary State and Local Program Development.[103]

The draft policy expresses the hope that states will develop their own "long-range plans which define groundwater problems and the legal and institutional means . . . to address those problems."[104] Such development would be entirely voluntary. States would be absolutely free either to "determine their own problems, approaches and resource priorities," or not to do so, as they saw fit.[105] The EPA would provide technical support and information to assist states in these efforts. It might, for example, furnish the states with regulatory models, or help to coordinate various state programs.[106]

This kind of *support* for state regulatory efforts already has been enormously helpful; but the current proposal contains no *incentives* for state compliance with any federal policy, only verbal encouragement. In fact, the Reagan Administration's withdrawal of financial support for state program development makes it likely that many states will do no more than they are required by federal statute to do. In addition, while the EPA says it wants to provide technical support and guidance for the states, it is proposing drastic reductions in Agency programs which would enable it to do what it says.[107]

To assure compliance by states with the various statutory requirements,[108] the EPA has until recently required each state to enter into an annual State/EPA Agreement (SEA).[109] The agreements describe each state's regulatory activities and goals for the coming year under RCRA,[110] SDWA,[111] and portions of the Clean Water Act.[112] Under the Carter Administration, completion of an SEA was made a prerequisite for state funding under various programs.[113] The SEA was to provide the *only* significant federal incentive under the Carter Strategy for state conformity to federal water policy.[114] Such agreements, however, now have been made voluntary. The Reagan Policy provides simply that "[w]here mutually agreed, State/EPA agreements or other mechanisms may be used to arrive at an understanding of the activities to be accomplished by the State and EPA in this area."[115]

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[102] Proof is found in the promulgation of regulations and enforcement under each statute, discussed *infra* text and notes at notes 178-372.

[103] Reagan Policy, *supra* note 19, at I. III.3., IV.

[104] *Id.* at IV.

[105] *Id.*

[106] *Id.* The Reagan Policy reports that nearly thirty states have begun to develop or are implementing strategies for the protection of groundwater. *Id.* at III.3.

[107] *See infra* text at notes 120-26.

[108] EPA says it will delegate specific regulatory programs upon attainment of "legislative requirements." Reagan Policy, *supra* note 19, at IV. However, fewer than two-thirds of the states and territories have approved NPDES programs; a smaller percentage have fully approved UIC or hazardous waste programs.

[109] "The Agreement will provide a way for EPA Regional Administrators and States to coordinate and, to the maximum extent feasible, integrate a variety of programs under the Clean Water Act, the Resource Conservation and Recovery Act, the Safe Drinking Water Act and, potentially, other laws administered by EPA." 43 Fed. Reg. 43,425 (1978). The SEA is described in detail, and guidelines for its preparation are set forth at 44 Fed. Reg. 17,294-308 (1979). Its practical operation is described in Environmental Protection Agency, Summary Proceedings: National Water Quality Management Conference 35 (1980).

There is even some evidence that the EPA is no longer concerned with requiring strict compliance by states or by individual polluters with federal statutory programs. For example, the number of enforcement cases referred to the Justice Department for prosecution has fallen dramatically during the past two years.[116] Further, the

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Although there is no explicit statutory authority for such agreements, each of the acts named requires the adoption of "necessary" regulations or coordination with other environmental programs. *See, e.g.*, CWA § 501(a), RCRA § 1006(b).

[110] 43 Fed. Reg. 43,425-27 (1978).

[111] 43 Fed. Reg. 47,130-32 (1978).

[112] 43 Fed. Reg. 40,742-43, 40,746-47 (1978), promulgated under CWA §§ 106, 208, 303(c); 44 Fed. Reg. 30,020, 30,026, 30,029 (1979), issued under CWA §§ 106, 208, 314 and 205(g); 45 Fed. Reg. 7792 (1980), issued under CWA § 314.

[113] For example, "[b]eginning in fiscal year 1980, State programs funded under [RCRA] will be part of the State/EPA agreement, and the State/EPA agreement must be completed before grant award." 40 C.F.R. § 35.738-6 (1982). To the same effect is 40 C.F.R. § 35.1016(c) (1982), promulgated under CWA § 205. For an argument that the EPA may not have the authority to impose such a requirement, see ENVIRONMENTAL DEFENSE FUND, *supra* note 9, at 39.

[114] CARTER STRATEGY, *supra* note 3, at VII-2, 4.

[115] REAGAN POLICY, *supra* note 19, at IV.

[116] Referrals of civil cases under all statutes totalled 200 in FY 1980, 116 in FY 1981, and 100 in FY 1982. [13 Current Developments] ENV'T REP. (BNA) 807 (1982). Perhaps in response to congressional criticism, there is some indication that the pace of referrals is beginning to increase. [13 Current Developments] ENV'T REP. (BNA) 1029 (1982). A new Agency policy purportedly aimed at boosting case referrals would allocate enforcement personnel among the regions according to the number and type of cases referred in the past. While one region would gain, however, the others would lose up to half their enforcement staffs in FY 1983. [13 Current Developments] ENV'T REP. (BNA) 920 (1982).

The EPA is not solely responsible for the reduced enforcement effort. A staff memorandum of the House Energy and Commerce Subcommittee on Oversight and Investigations, dated March 9, 1983, concluded that the number of hazardous waste cases prosecuted by the Department of Justice has dropped sharply since 1980. While 88% of cases referred by the EPA to the Justice Department during FY 1980 were filed, in 1982 and 1983 to date only 13% and 14% of the cases were filed, respectively. Of 16 Superfund cases referred during 1982 and 1983, only one has been filed. [13 Current Developments] ENV'T REP. (BNA) 2075 (1983). H.R. 2867, 98th Cong., lst Sess. (1983), would amend RCRA to give the EPA authority to bring its own enforcement action if the Justice Department failed to act within 30 days of a referral.

Agency has proposed rule changes which would make it harder to monitor each state's progress or even for a state to monitor its own progress.[117]

State regulators long have relied on federal technical assistance in implementing their own programs. Many states lack either the financial means or the technical competence to develop much needed new information about groundwater pollution transport mechanisms, health effects, etc. Thus, it makes sense for the federal government to conduct research on groundwater pollution and its control, due to the enormous cost and complexity of the task, especially when the results of each study can often be applied in more than one state.[118] Yet, while the EPA says it intends to "maintain a strong and productive research and development program with emphasis on effective transfer of information, methods, and technology to State officials,"[119] it has made drastic reductions in its research and development budget.[120]

Beyond any failure of federal incentives or technical support, the EPA recently has begun to withdraw direct financial support for state program development. No grants would be made for the express purpose of implementing federal policy.[121] Funding for groundwater protection planning under the Clean Water Act Section 208 was ended in FY 1982,[122] and reduced grants to states under various statutory programs are planned.[123] In fact, former

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[117] For example, the EPA proposes to abandon its annual reporting requirement for hazardous waste generators under RCRA, and instead to conduct a biennial survey of 10% of such generators. This would deprive not only state and federal regulators, but also individual citizens, of information needed to monitor compliance with federal requirements. 47 Fed. Reg. 44,932 (1982).

[118] Consideration of the economies of scale support centralization of this work and duplication of effort in the various states would be wasteful. *See* Water Resources Council, *supra* note 89, at V-3.

[119] Reagan Policy, *supra* note 19, at IV, III.6.

[120] The FY 1984 appropriation approved by Congress includes Research and Development funding of $142.7 million, about half of the $270 million provided in FY 1981. [14 Current Developments] Env't Rep. (BNA) 396 (1983).

[121] Memo from Groundwater Policy Group, *supra* note 8, at 9. In the same document the cost to the states through FY 1984 is estimated at as much as $9.5 million. States would, however, be free to substitute groundwater protection for other work now supported through federal grants. *Id.* at 2.

[122] Some state regulators hope to continue groundwater planning with funding under the UIC program, Clean Water Act § 106, or § 205(j).

[123] Original EPA budget proposals would have reduced grants for hazardous waste programs from $44 million in FY 1983 to $40 or $42 million in FY 1984; for UIC programs from $7 million to $6 million; and for public water supply protection from $27 million to $21 million. [13 Current Developments] Env't Rep. (BNA) 1371 (1983). The appropriations bill approved by Congress is only slightly more generous. [14 Current Developments] Env't Rep. (BNA) 396 (1983).

Administrator Gorsuch has stated that it was her belief that *all* state environmental grants should eventually be eliminated.[124] The states, however, are heavily dependent on such funds. Federal funds now supply about one-half of state environmental budgets,[125] and recent surveys of state administrators indicate that with funding cuts proposed for the FY 1984 budget, many states will let delegated programs go *back* to EPA, while other states simply will not qualify for primacy over their own programs in the first place.[126] It is likely that without federal assistance, other state programs not mandated by federal statute will also be dropped.

In short, the proposed policy offers no new federal incentives for compliance by the states, yet it asks the states to take a more active role in ensuring groundwater purity. In this respect, the proposal seems unrealistic, if, in fact, it is intended to provide more than the minimum protection for groundwater already mandated by statute.

C. The Regulation of Water Use and Water Rights is Within the Exclusive Province of the State.[127]

We have learned a lot since the Vermont Supreme Court declared in 1855:

> The secret, changeable, and uncontrollable character of underground water in its operations, is so diverse and uncertain that we cannot well subject it to the regulation of law, nor build upon it a system of rules, as is done in the case of surface streams.[128]

In the intervening time "the science of groundwater hydrology as well as societal concern for environmental protection has developed dramatically. As a matter of scientific fact the courses of subterranean waters are no longer obscure and mysterious."[129] It is fair to say that questions of groundwater movement and quantity and groundwater quality now are known to be inextricably linked in many instances.[130] Thus, it is surprising that the EPA would propose a national program to control groundwater pollution without asserting any authority over groundwater allocation. Its desire to leave issues of water use and water rights entirely to the states seems misguided.

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[124] [13 Current Developments] ENV'T REP. (BNA) 924 (1982).

[125] William Drayton, Chairman, American Environmental Safety Council [13 Current Developments] ENV'T REP. (BNA) 925 (1982). To the same effect is a survey by the National Governors' Association, *reported in* U.S. WATER RESOURCES COUNCIL, STATE OF THE STATES: MANAGEMENT OF ENVIRONMENTAL PROGRAMS IN THE 1980s (1982).

[126] *Id.* Another survey with similar results is reported in [13 Current Developments] ENV'T REP. (BNA) 64 (1982). *See also* Pasztor, *supra* note 64.

[127] REAGAN POLICY, *supra* note 19, at III.7.

[128] Chatfield v. Wilson, 28 Vt. 49, 54 (1855).

[129] Wood v. Picillo, 443 A.2d 1244, 1249 (R.I. 1982).

[130] The Reagan Policy declares, "[w]ater quality and water quantity are closely linked." REAGAN POLICY, *supra* note 19, at III.7.

We are now aware of many instances where groundwater extraction and diversion have affected groundwater quality. Many communities have experienced saltwater intrusion into fresh aquifers as a result of groundwater pumping.[131] Others have seen pollution "plumes" from waste dumps or disposal wells diverted by groundwater withdrawals, either within an aquifer or between aquifers.[132] In some cases, the perforation of impermeable strata by wells has allowed the migration of pollutants between aquifers. The resulting destruction of freshwater supplies has been enormously costly, as well as dangerous.[133]

These problems will be alleviated or prevented only through conjunctive management of pollution sources and groundwater withdrawals. Decisions about the siting and operation of pollution sources commonly require consideration of effects on drinking water supplies. By the same token, no water supply well of any sort should be installed without consideration of all the environmental effects. The EPA hopes that states will take into account the effects of such decisions if and when they develop their own comprehensive management strategies.[134] But the Agency "will not in any way invade this jurisdiction" of the states by directly regulating local groundwater use.[135] Where the states fail to undertake such conjunctive management, of course, the goals expressed in the national policy may not be met.

Groundwater allocation questions have usually been resolved by state authorities applying state laws. The effect of these state laws, however, is quite limited. While statutory permit systems have been adopted in most western states,[136] fewer than half the eastern states have any centralized planning or control of groundwater use.[137]

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[131] The physical problems, along with examples and proposed solutions, are described in Magnuson & Miller, Groundwater Use Management in the Northeast: Experience and Recommendations, in Groundwater Use Management in The Northeastern States 31 (L. Raymond ed. 1981); E. Selig, *supra* note 75, at 23-30.

[132] *Id.*

[133] *Id.*

[134] Reagan Policy, *supra* note 19, at III.7.

[135] *Id.*

[136] One of the newest is the Arizona Groundwater Code, Ariz. Rev. Stat. §§ 45-401 to 637 (Supp. 1982).

[137] As of June 1979, only 13 of 31 eastern states had any permit system for allocation of groundwater. Water Resources Council, *supra* note 89, at II-1.

None of the permit systems is really comprehensive.[138] Most require no consideration of the effect of withdrawals on water quality.[139] In addition, all states exempt some types of users (such as single family domestic consumption)[140] or amounts (for example, up to 50,000 gallons per day capacity),[141] or both, from regulation. Some regulate withdrawals only in areas or at times of critical shortages.[142] Where no permit scheme is applicable the decisional law of the state, enforced through two-party litigation, is controlling. In short, there is, with rare exception, no conjunctive management of groundwater quantity and quality by the states at this time.

Federal, not state, law has controlled the allocation of water among the states,[143] and in certain cases, has determined the result of claims by individual citizens against their own states.[144] Federal rules also have prevailed over contrary state laws in cases involving interstate commerce,[145] the power to tax and spend,[146] or use by the federal government of its own property.[147] Because the national interest in controlling groundwater pollution is so strong, there seems to be no want of constitutional authority for federal rules to control groundwater allocations as well, at least where a withdrawal might affect groundwater quality.[148] That states traditionally have controlled such allocations should not change the result.[149]

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[138] Permit programs for the various states are described in Water Resources Council, State of the States: Water Resources Planning and Management—Ground Water Supplement (1981).

[139] The New York law is an exception, in permitting limitations on certain wells on Long Island where salt water intrusion, for example, might result from overpumping. N.Y. Envtl. Conserv. L. § 15-1527 (McKinney 1973 & Supp. 1983).

[140] Fla. Stat. Ann. § 373.326(2) (West 1974).

[141] Ariz. Rev. Stat. § 45-454 (Supp. 1982).

[142] *See, e.g.*, N.J. Stat. Ann. § 58:1A-4 (West 1982).

[143] Allocations are made either judicially, through equitable apportionment, *see, e.g.*, Kansas v. Colorado, 206 U.S. 46 (1907), or by act of Congress, *see, e.g.*, Arizona v. California, 373 U.S. 546 (1963).

[144] *See, e.g.*, Badgley v. City of New York, 606 F.2d 358 (2d Cir. 1979).

[145] *See, e.g.*, First Iowa Hydro-Electric Cooperative v. Federal Power Comm., 328 U.S. 152 (1946), where state law would have prevented federal licensing of a hydro-electric dam; or Sporhase v. Nebraska, 102 S. Ct. 3456 (1982), where a state statute would have restricted the export of groundwater.

[146] *See, e.g.*, United States v. Gerlach Livestock Co., 339 U.S. 725 (1950).

[147] *See, e.g.*, Cappaert v. United States, 426 U.S. 128 (1976).

[148] If rules for controlling water quality are properly grounded in the Commerce Clause, for example, so would be rules for water allocations which affect water quality.

[149] In Hodel v. Virginia Surface Mining and Reclamation Ass'n, 452 U.S. 264 (1980), the Court refused to strike down portions of the federal Surface Mining Control and Reclamation Act on grounds that it interferes with the states' "traditional governmental function" of regulating land use.

Certainly, the federal government should make decisions about its own activities affecting groundwater availability in a way that is consistent with its own groundwater quality programs. There is some opinion that the federal government should give financial and technical aid to states for development of their own conjunctive management strategies.[150] Perhaps it also should demand that state groundwater allocations, however made, be consistent with federal pollution control programs.[151] One way to do this would be to require a groundwater quality impact analysis before any groundwater withdrawal could be made. In the event of a substantial impact, a withdrawal would be permitted by state regulators only if it did not conflict with some federal program.[152] It makes no more sense to insist on perfect state autonomy in such a case than it does to argue that, because states traditionally make land use decisions, a state permitted skyscraper can be erected at the end of a federally approved airport runway.

Thus, the EPA's policy of leaving questions of groundwater allocation entirely to the states seems misguided. This policy ignores the limited extent to which states consider water quality in making allocation decisions. It also fails to take into account the legitimate federal interests affected by groundwater withdrawals.

D. *Groundwater Quality Protection Should be Based Upon Current and Projected Uses of the Water.*[153]

A central premise of the Reagan Policy is that groundwaters should be protected in varying degrees only to the extent needed for "current and projected future uses."[154] The reason given is that all groundwaters are not of the same value, some serving a critical human or ecological need, others being so polluted that restoration is not feasible. Judgments would be made, albeit in the face of great uncertainty, about uses to be assigned to each aquifer, and protective strategies would be fashioned for each aquifer accordingly. What is envisioned is a kind of zoning scheme for groundwaters, perhaps without any uniform standards to guide local decisionmakers. A policy of "non-degradation", one which is designed to prevent all detectable contamination, is expressly rejected as unfeasible.[155]

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[150] WATER RESOURCES COUNCIL, *supra* note 89, at V-7.

[151] *Id.* at V-9. The Carter Strategy hinted at such a requirement in proposing that state strategies describe the interrelationship between federal programs and "state programs related to groundwater quantity and allocation uses." CARTER STRATEGY, *supra* note 3, at VII-3.

[152] Such a requirement could be imposed as part of an approved state permitting process. This sort of "cooperative federalism" may be seen in various statutory programs. *See, e.g.*, a description of the surface mining program in Hodel v. Virginia Surface Mining and Reclamation Ass'n, 452 U.S. 264, 289 (1981).

[153] *Id.* at II, IV.

[154] *Id.* at II.

The Carter Strategy proposed the classification of each aquifer within every state "according to the differing degrees of protection warranted."[156] The EPA meant to develop detailed standards for classification, requiring consideration not only of present and future uses, but also of groundwater quality, yield, vulnerability to degradation, and availability of alternative supplies.[157] Levels of control for various polluting activities, from siting or technical requirements to outright bans, then would have been applied to each aquifer depending upon the use chosen.[158] The Reagan Policy mentions no such standards or control techniques, saying only that protection must be carried out "within statutory and economic constraints,"[159] recognizing the need for "flexibility to accommodate the great variations across the nation in natural climatic, geologic and hydrologic conditions and in the uses of groundwater."[160] Under either proposal, classification would be the job of the states.[161]

These classification schemes resemble the assignment of uses to surface waters under Section 303 of the Clean Water Act.[162] Unlike the Clean Water Act, however, neither proposal would require the application of uniform water quality criteria, based on scientific and technical factors, for each type of use. According to the EPA, technological bases for specification of groundwater quality standards are "simply not ready."[163] Yet, the success of the classification scheme is entirely dependent upon the maintenance of an appropriate groundwater quality standard for each aquifer.

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[155] *Id.*

[156] Carter Strategy, *supra* note 3, at V-5. Possible classifications ranged from "highly valued drinking water" at one extreme, to "limited waste disposal" at the other. *Id.* at VII-5. All groundwaters were to be presumptively classified at lower levels only after a "full and formal public review." *Id.* at VII-6. A similar presumption under the UIC program now has been abandoned. *See infra* notes 257-58.

[157] Carter Strategy, *supra* note 3, at VII-4.

[158] *Id.* at VII-7. Where a federal program such as RCRA was involved, controls were to be at least as stringent as those prescribed in EPA regulations.

[159] Reagan Policy, *supra* note 19, at II.

[160] *Id.*

[161] *Id.* at II, IV; Carter Strategy, *supra* note 3, at VII-8. At least 15 states have already established aquifer classification systems. Water Resources Council, *supra* note 89, at II-4. Classification of aquifers is already contemplated in several federal statutes. *See, e.g.*, CWA § 106(e)(1), 33 U.S.C. § 1256(e)(1) (1976) (grants for pollution control programs); CWA § 201, 33 U.S.C. § 1281 (1976 & Supp. V 1981); municipal wastewater treatment guidelines, *infra* note 224; UIC program "exemption" of aquifers, *infra* text at notes 260-61.

[162] The development of water quality standards for surface waters is discussed *infra* text and notes at 180-81.

Both proposals expressly reject a policy of nondegradation. Until very recently, the EPA has enforced a policy designed to "protect and enhance" the quality of air and surface waters and to forbid their degradation.[164] The Carter Strategy (and perhaps the Reagan Policy) would allow the deliberate lowering of groundwater quality from current levels, even to curtail existing uses, where competing uses such as waste disposal, energy production, agricultural or industrial uses were determined to be "necessary and appropriate."[165]

The proposal to make the degree of protection dependent on use is remarkable in several ways. First, it assumes that future drinking water and other needs can be reliably predicted. Of course, more than ordinary "judgment" will be required to accurately forecast patterns of growth, development and resettlement, competing uses, or the availability of alternate supplies, say, fifty or one hundred years into the future. The plain truth is that current use designations often will *determine* future uses, since it may be difficult to adjust the water quality in a given aquifer to accommodate changing needs.[166]

Second, even if we could accurately predict future needs, it may be impossible to predict the effects of current acts of degradation. The Carter Strategy recognized that "it is extremely difficult, if not impossible, at our current state of knowledge, to analyze changes in groundwater quality as a result of a particular land-use activity."[167] Such a realization counsels adoption of the most conservative approach to pollution control. Yet, a policy which permits certain activities believed to affect water quality according to anticipated future use assumes that the extent of groundwater degradation *can* be predicted.

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[163] "There is more to be done in the areas of monitoring, groundwater modeling, fate and effect research, and other areas before groundwater quality standards can broadly serve as a basis for regulatory requirements at individual sites." CARTER STRATEGY, *supra* note 3, at VIII-3.

[164] The EPA's long-standing non-degradation policy, and current plans to abandon it, are described *infra* note 218.

[165] CARTER STRATEGY, *supra* note 3, at VII-7.

[166] "[B]ecause it may often be exceedingly difficult and expensive to clean up groundwater once it is contaminated, a decision to classify groundwater now suitable for drinking for a less protective use can have far-reaching and, in some cases, devastating consequences." CARTER STRATEGY, *supra* note 3, at VII-5. The durability of groundwater pollutants is documented in SHIFRIN & NOLAN, *supra* note 7, at 1.

[167] CARTER STRATEGY, *supra* note 3, at III-7. Furthermore, "groundwaters often remain underground for hundreds of years; contaminants deposited today in a given location may emerge miles away in the twenty-third century or beyond." *Id.* at VI-3.

Third, downgrading of uses (and consequently of levels of control) by state and local regulators would create new opportunities, not based on any existing expectations, for private polluters to impose some of their costs on the public. There would be fewer incentives for product substitution, recycling of wastes, or development of new processes which generate fewer pollutants. Resulting industry migrations could be expected to make achievement of national uniformity impossible.

Certainly those activities which present a serious *risk* of groundwater contamination should be relegated to areas in which any pollution, *if it occurs*, would be least injurious. If hazardous wastes, for example, *must* be disposed of on or in the ground, it makes sense to locate a disposal facility so that if its containment is breached a major source of drinking water will not be destroyed.[168] The classification of an aquifer to permit its deliberate contamination, however—in effect to create a sacrifice zone—seems advisable only under the most extraordinary circumstances.

E. Existing Statutory Programs Will Enable Us to Meet Groundwater Protection Goals.[169]

The Reagan Policy, like the Carter Strategy before it, maintains that existing federal, state, and local laws will enable the protection of groundwater "without the creation of an additional Federally mandated program structure."[170] Local governments will exercise traditional land use planning and police powers. States will create special purpose districts or enforce statewide standards, and federal statutory authority will be exercised by all three levels of government.[171]

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[168] RCRA regulations discussed *infra* notes 278-92, may provide little peace of mind, since there now is considerable evidence that all landfills eventually leak. *Infra* text and note at note 348. Vermont's Groundwater Protection Strategy (1982) creates two classes of aquifers: one which does or might serve as a community drinking water supply, to be given special protection; another representing all other uses. While the second type could be exposed to *risks* of contamination, deliberate degradation would not be allowed. Connecticut's program does permit discharges into one type of aquifer. STATE OF CONN., DEPT. ENVTL. PROTECTION, CONNECTICUT WATER QUALITY STANDARDS & CRITERIA 6 (1980).

[169] REAGAN POLICY, *supra* note 19, at I., II.2.

[170] *Id.* at III.2.

[171] *Id.*

Many state regulators, however, feel that they lack sufficient statutory authority to protect groundwaters.[172] Local officials, too, are often frustrated by such limitations.[173] There may be, as the EPA suggests, ample federal authority to do the job, but that authority is meaningless unless it is exercised. In the development of a national groundwater policy, we have to be concerned not only with the adequacy of enabling legislation, but also with the resolve of the EPA to implement it.

Until now, the Agency has not always pursued its authority vigorously, but for a variety of reasons, has dragged its feet and taken the line of least resistance.[174] As the following discussion indicates, it has been consistently late in promulgating regulations.[175] It has often been reluctant to enforce either statutory directives or its own rules,[176] and it has refused to test the limits of its authority under many statutes, preferring instead a more restrictive view of its responsibilities.[177] The EPA appears to be guided already by an unannounced policy of non-exercise and non-intervention. The current proposal would only make that policy public.

The next section briefly examines the Agency's interpretation and application of the major federal acts affecting groundwater. It will be shown that the EPA probably does have sufficient authority to protect the nation's groundwaters, if only that authority were exercised. Where current authority is in doubt, reforms are suggested to make that authority clearer or more effective.

IV. FEDERAL STATUTORY PROGRAMS.

A number of federal statutes directly address the protection of our nation's groundwaters. Many others, in their implementation, affect groundwater use or groundwater quality. Taken together, these acts reflect a strong *Congressional* policy to safeguard the health of our citizens and their environment through protecting groundwater quality. The following discussion outlines the most important existing legislation, and explains how the Environmental Protection Agency has exercised its authority under these statutes.

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[172] Perhaps three-quarters of state officials feel their statutory authority is inadequate. SHIFRIN & NOLAN, *supra* note 7, at 18.

[173] *Id.*

[174] The reasons usually given for the EPA's lack of progress in this area are overwork, underfunding, and the great technical complexity of the subject. CARTER STRATEGY, *supra* note 3, at III-11, IV-1. Recent EPA proposals to cut its own staff and budget, however, indicate that the Agency believes those obstacles now have been overcome.

[175] *See, e.g., infra* note 311.

[176] Various examples appear in the following section, *infra* text and notes at notes 131-308.

[177] *See, e.g., infra* text and notes at notes 185-202.

A. Clean Water Act

In the 1972 Amendments to the Federal Water Pollution Control Act (commonly referred to as the Clean Water Act),[178] Congress clearly expressed its concern over the growing threat from groundwater pollution. It directed the EPA to "develop comprehensive programs for preventing, reducing, or eliminating the pollution of the navigable waters and groundwaters and improving the sanitary condition of surface and underground waters."[179] Reference was made throughout the Act to groundwaters, as well as to navigable waters, or more often simply to "waters." Both in the language of the Act and in its history there is considerable evidence that Congress intended the application of the same uniform regulatory mechanism for the protection of groundwaters that is plainly provided for surface waters. As the following discussion reveals, however, there is some evidence to the contrary, that it was Congress' intent that the various states retain control over their respective groundwater resources, with the assistance but not the direct intervention of the EPA.

The primary regulatory strategy of the Clean Water Act (CWA) consists of end-of-the-pipe source limitations, coupled with standards for water quality. Briefly, the EPA is required by Section 304(a) of the Act to develop and publish criteria for water quality, and to provide information on the "factors necessary to restore and maintain the chemical, physical, and biological integrity" of both navigable waters and groundwaters.[180] This information is used to promulgate water quality standards under Sections 303(a)-(c), which establish designated uses for particular bodies of water and quality standards based upon such uses.[181] The EPA must also publish guidelines under Section 304(b) for the purpose of adopting or revising end-of-the-pipe discharge limitations described in Section 301.[182] These effluent limitations are applied in the issuance of permits pursuant to the National Pollutant Discharge Elimination System (NPDES) outlined in Section 402.[183] A discharger, however, may be restricted even further if its discharge would threaten established water quality standards.[184] Other sections of the Act deal with planning for publicly owned waste treatment works, toxic pollutants, and a host of other water quality problems. The applicability of the Clean Water Act to activities affecting groundwater will now be examined by reviewing EPA efforts to apply the statute in several settings.

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[178] 33 U.S.C. §§ 1251-1376 (1976 & Supp. V 1981) [hereinafter cited as CWA].

[179] CWA § 102(a), 33 U.S.C. § 1281 (1976 & Supp. 1981).

[180] 33 U.S.C. § 1314(a)(2)(A) (1976). Criteria for quality of *surface* waters, consisting of numerical standards for 48 specific pollutants, plus guidance on such related matters as smell, color and hardness, are found in Environmental Protection Agency, Quality Criteria for Water (1976), 41 Fed. Reg. 32,947 (1976).

[181] The procedure for establishment of water quality standards is described in Mississippi Comm. on Natural Resources v. Costle, 625 F.2d 1269 (5th Cir. 1980).

[182] 33 U.S.C. § 1314(b) (1976 & Supp. V 1981).

1) Three Cases Involving Underground Injections

In 1974, the EPA brought suit to require a permit for the disposal of organic chemical wastes into deep wells by the GAF Corporation.[185] No surface discharge permit was involved and no effect on any surface water supply was alleged. The district court found that no permit can be required until effluent limitations for groundwater are promulgated under Section 301.[186] In a second, and far more important holding, the court found that the EPA lacked authority under the Clean Water Act to directly regulate groundwater pollution at all, at least insofar as such pollution is not alleged to flow into or otherwise affect surface waters.[187] On the strength of this single decision, not appealed by the EPA, and of an earlier opinion of its own General Counsel,[188] the Agency has issued no regulations for direct federal controls of groundwater discharges.

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[183] Sections 402(b)-402(f), 33 U.S.C. § 1342(b)-1342(f) (1976 & Supp. V 1981), provide that a state may establish its own discharge permit system to operate in lieu of the one administered directly by the EPA under § 402(a), 33 U.S.C. § 1342(e) (1976 & Supp. V 1981).

[184] Water quality related effluent limitations are prescribed in 33 U.S.C. §§ 1311(b)(1)(c), 1312, and 1313(d) (1976). The relationship between these three sections is explained in Homestake Mining Co. v. EPA, 477 F. Supp. 1279, 1284-86 (D. S. Dak. 1979). *But see*, 33 U.S.C. §§ 1311(g) and 1311(h) (1976 & Supp. V 1981) describing circumstances in which an effluent limitation might be relaxed if public health or achievement of the 1983 fishable/swimmable standard in § 1251(a)(2) (1976) would not be jeopardized.

[185] United States v. GAF Corp., 389 F. Supp. 1379 (S.D. Tex. 1975).

[186] *Id.* at 1385-87. This in spite of the plain language of § 402(a)(1), 33 U.S.C. § 1342(a)(1) (1976), which states that even prior to taking implementing action with regard to listed sections, including § 301, 33 U.S.C. § 1311 (1976 & Supp. V 1981), the EPA may issue permits upon "such conditions as the Administrator determines are necessary to carry out the provisions of this chapter."

The courts are not yet in agreement on this point. *Compare* Republic Steel Corp. v. Train, 557 F.2d 91 (6th Cir. 1977), Ford Motor Co. v. EPA, 567 F.2d 661 (6th Cir. 1977), Washington v. EPA, 573 F.2d 583 (9th Cir. 1978), approving the holding in GAF, *with* NRDC v. Train, 510 F.2d 692, 710 (D.C. Cir. 1974), United States Steel Corp. v. Train, 556 F.2d 822, 830 (7th Cir. 1977), and United States v. Frezzo Bros., 602 F.2d 1123 (3d Cir. 1979). Republic Steel Corp. v. Train seems to be overruled, at least in part, by Republic Steel Corp. v. Costle, 581 F.2d 1228, 1231 (6th Cir. 1978).

[187] GAF Corp., 389 F. Supp. at 1383-85. The GAF case is critically examined in Eckert, *EPA Jurisdiction Over Well Injection Under The Federal Water Pollution Control Act*, 9 NAT.

The EPA did decide, however, to require permits for groundwater discharges "associated" with surface water discharges.[189] This policy was challenged two years later in two factually similar cases, *Exxon v. Train*[190] and *United States Steel Corp. v. Train.*[191] In *Exxon*, the Fifth Circuit Court of Appeals decided that the EPA had no authority to limit waste disposals into deep wells, since the Clean Water Act only requires permits for discharges in "navigable" waters.[192] It also found that Section 402(b)(1)(D), providing that state NPDES programs must have the authority to control well disposals, did not give the EPA the same authority.[193] The court found

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RES. L. 455 (1976); Wilson, *Ground Waters: Are They Beneath the Reach of the Federal Water Pollution Control Act Amendments?*, 5 B.C. ENVT'L AFF. L. REV. 545 (1976); Note, *United States v. GAF Corp: A Leak in FWPCA?*, 6 ENVTL. L. 561 (1975).

[188] Memorandum from Acting Deputy General Counsel, EPA, to Regional Counsel, Region IX, regarding Applicability of NPDES to Disposal of Pollutants into Wells, Dec. 13, 1973. The opinion is reproduced in Exxon Corp. v. Train, 554 F.2d 1311, 1320 n.21 (5th Cir. 1977). It states that the Agency's jurisdiction over groundwater discharges is limited to cases where a discharge into surface waters also is proposed or is occurring. This conclusion was based on a reading of CWA § 502(12), 33 U.S.C. § 1362(12) (1976), in which the term "discharge of a pollutant" is defined as "any addition of any pollutant to navigable waters." *Id.* at 1321 n.21. Since groundwaters are not navigable, the reasoning went, a discharge to groundwater could not, by itself, constitute a discharge requiring a permit under § 402, 33 U.S.C. § 1342 (1976 & Supp. V 1981). *Id.* at 1321 n.21.

[189] 40 C.F.R. § 125.26(a), reproduced in Exxon Corp. v. Train, 554 F.2d 1310, 1320 (5th Cir. 1977). This policy was reiterated in Decision of the General Counsel No. 6 (April 8, 1975), reprinted *id.*

[190] 554 F.2d 1310 (5th Cir. 1977).

[191] 556 F.2d 822 (7th Cir. 1977).

[192] 554 F.2d at 1318. Echoing the EPA General Counsel's earlier opinion, the court held that since § 502(12) defines "discharge of pollutant" as "any addition of any pollutant to *navigable* waters," the EPA has no authority to limit discharges into deep wells, since groundwaters, as such, are not navigable. This construction was earlier rejected in *GAF Corp.*, where the court observed that in § 502(7) "navigable waters" means "the waters of the United States, including the territorial seas." Said the *GAF Corp.* court, "[t]his definition effectively excludes from consideration any concept of navigability, in law or in fact." 389 F. Supp. at 1383. The *Exxon* court was simply mistaken in its contrary reading of *GAF Corp.* 554 F.2d at 1318 n.17.

The Conference Report on the 1972 Amendments referred to § 502(7) as follows: "The conferees fully intend that the term 'navigable waters' be given the broadest possible constitutional interpretation unencumbered by agency determinations which have been made or may be made for administrative purposes." S. REP. No. 1236, 92d Cong., 2d Sess. 144 (1972).

[193] 554 F.2d at 1322. The *GAF Corp.* court found that "Congress could not possibly have meant to achieve in roundabout fashion what it expressly declined to accomplish straightforwardly." 389 F. Supp. at 1385. The *U.S. Steel* court, however, found the same authority in the EPA, since § 402(a)(3) provides that the EPA's permit program "shall be subject to the same terms, conditions, and requirements as apply to a state program." 556 F.2d at 852.

in the "structure" of the Act "a clear pattern of Congressional intent . . . of federal information gathering and encouragement of state efforts to control groundwater pollution," but not of direct federal control.[194] This conclusion is borne out, the court said, by the legislative history.[195]

In *United States Steel*, however, decided only six weeks earlier,[196] the Seventh Circuit Court had reached the opposite conclusion on the scope of the EPA's authority. That court described the Agency's permit requirement for deep well disposals as part of an overall effort to limit surface discharges.[197] Said the court, "EPA . . . could have properly concluded that too little is known about the effects of discharges into groundwaters to justify allowing increases in them."[198] Moreover, it found in the language of the Act and in its history evidence that Congress intended to provide federal controls of waste disposal into wells.[199]

No regulations have been promulgated under § 402(b)(1)(D), and it is not clear whether or how a state could be compelled to exercise the authority which it is required to demonstrate.

[194] 554 F.2d at 1322. In support of this conclusion the court cited §§ 102(a), 104(a)(5), 106(e)(1), 208(b)(2)(K), 202(a)(2) (renumbered (b)(2)), 304(a), and 304(e) (renumbered (f)) as calling for disparate treatment of groundwaters, although some certainly apply with equal force to surface waters. To be sure, § 304(f), which requires the Administrator to issue information about "the disposal of pollutants in wells or in subsurface excavations," is not expressly linked, like § 304(b), to the development of effluent limitations. Other activities in the same section, however, such as mining, have been found to be point sources subject to direct control. *See, e.g.*, Sierra Club v. Abston Const. Co., 620 F.2d 41, 45 (5th Cir. 1980).

[195] The court quoted from a report of the Senate Committee on Public Works, S. REP. NO. 414, 92d Cong., 1st Sess. 73 (1971):

> Several bills pending before the Committee provided authority to establish Federally approved standards for groundwaters which permeate rock, soil, and other subsurface formations. Because jurisdiction regarding groundwater is so complex and varied from state to state, the Committee did not adopt this recommendation.

554 F.2d at 1325. *See also* United States v. GAF Corp., 389 F. Supp. 1379, 1383 (S.D. Tex. 1975).

Both courts also attached great importance to the defeat on the House floor of an amendment which would have, among other things, extended unequivocally the regulatory reach of §§ 303(c), 502(11) and 502(12) to groundwater. 554 F.2d at 1327-29. The same amendment, however, would have removed the exemption in § 502(6) for injections related to oil and gas production. Most of the debate on the amendment centered on this latter issue, and some of it reflects an assumption by House members that injection wells would, unless expressly exempted, be regulated, 118 CONG. REC. 10,666 (1972). There is reason to believe that the entire amendment was defeated by the lobbying efforts of the petroleum industry.

[196] *U.S. Steel* was decided on May 13, 1977, *Exxon* on June 27 of the same year. The *Exxon* court did not refer to the *U.S. Steel* case.

[197] 556 F.2d at 851 n.60.

[198] *Id.* 852 n.61.

[199] For example, because of the express exclusion of injections for oil and gas production under § 502(6)(B), the court applied the canon *expressio unius est exclusio alterius*, to hold that other kinds of undergound injections may properly be regulated under § 402(a)(3) and (b). 556 F.2d at 852. A different interpretation of the legislative history is set forth, *id.* at 852-53.

Surprisingly, the decision in *Exxon* was not appealed by the EPA. While the regulation tested in these two cases is still on the books, the Agency has accepted the *Exxon* decision as "controlling in light of the Safe Drinking Water Act's coverage of underground waters."[200] Nevertheless, as the following discussion indicates, under the EPA's current interpretation of the Safe Drinking Water Act[201], a permit might not be required today for the types of underground injections which gave rise to the *Exxon, United States Steel,* or *GAF Corp.* cases.[202]

2) Regulation of Indirect Sources

The Agency has been more aggressive in asserting its authority to regulate pollution sources other than wells which do not connect directly or immediately with navigable waters. Since NPDES permits are required only for discharges from point sources,[203] in a number of cases, EPA authority has depended upon factual determinations that such sources were "point sources."[204] The case law indicates that the EPA has considerable discretion in characterizing a particular type of discharge as being from a point source.[205] Once it is so characterized, however, the Agency must regulate that dis-

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200. Memorandum from EPA General Counsel to Region II Director, Water Division, May 29, 1979, 43 Fed. Reg. 37,081 (1978).

201. *See infra* text and notes at notes 243-71.

202. With regard to the EPA's reliance on SDWA to control one source of groundwater pollution, it should be noted that after nine years, the Agency still has not promulgated final regulations for all types of wells under the UIC program.

203. CWA § 301(a), 33 U.S.C. § 1311(a) (1976), makes the "discharge of a pollutant unlawful," except in compliance with various numbered sections of the Act, including § 402, 33 U.S.C. § 1342 (1976 & Supp. V 1981). Section 502(12), 33 U.S.C. § 1362(12) (1976) says "discharge of a pollutant" means "any addition of any pollutant to navigable waters from any point source." The rationale for this limitation is not entirely clear.

204. The term "point source" is defined in § 502(14) to mean,

> any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. The term does not include return flows from irrigated agriculture.

33 U.S.C. § 1342(14) (1976 & Supp. V 1981). A "non-point source" has been defined as "one that does not confine its polluting discharge to one fairly specific outlet, such as a sewer pipe, a drainage ditch or a conduit." S. REP. NO. 414, 92d Cong., 1st Sess. 98-99 (1971).

205. NRDC v. Costle, 568 F.2d 1369 (D.C. Cir. 1977) (concerning regulations for stormwater, agricultural and silvicultural sources). The EPA has successfully characterized as point sources coal mining spoil piles, Sierra Club v. Abston Const. Co., 620 F.2d 41 (5th Cir. 1980); coal storage areas, Consolidation Coal Co. v. Costle, 604 F.2d 239 (1979); a gold leaching operation, United States v. Earth Sciences, Inc., 599 F.2d 368 (10th Cir. 1979); a compost heap, United States v. Frezzo Bros., 602 F.2d 1123 (3d Cir. 1979); uncollected agricultural

charge.[206] Because CWA Section 502(14) expressly mentions a "well" as one type of point source, the decision not to regulate well discharges is puzzling.[207]

Other cases have addressed the need for a point source to discharge *directly* into navigable waters. One recent decision rejects the suggestion of such a requirement as frivolous.[208] Other courts have reached the same result by a liberal reading of the term "navigable waters," either treating diffused surface and groundwaters as tributaries,[209] or regarding such waters as "waters of the United States" within the meaning of Section 502(7).[210]

Although there is no evidence that the EPA has sought to extend its influence to groundwaters, as such, these indirect source cases suggest that it is responsible for regulating at least those point sources where a "clear hydrological nexus" exists between groundwaters affected by a discharge and a navigable waterway.[211] Such an interconnection certainly could be shown in many instances, and perhaps should be *presumed* in every case, requiring the discharger to disprove the existence of any threat to the nation's waters.

The EPA has recognized the potential for requiring NPDES permits for groundwater pollution, but it has dismissed the idea with the

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runoff, United States v. Oxford Royal Mushroom Products, Inc., 487 F. Supp. 852 (E.D. Pa. 1980); and a garbage dump, O'Leary v. Moyer's Landfill, Inc., 523 F. Supp. 642 (E.D. Pa. 1981). *But see* Appalachian Power Co. v. Train, 545 F.2d 1351 (4th Cir. 1976).

[206] NRDC v. Costle, 568 F.2d 1369, 1377-78 (D.C. Cir. 1977).

[207] The *GAF Corp.* court simply disregarded this explicit reference to follow what it called "the straight path of legislative history" to a different conclusion. 389 F. Supp. at 1304.

[208] O'Leary v. Moyer's Landfill, Inc., 523 F. Supp. 642, 647 (E.D. Pa. 1981). In debate over the 1972 Amendments, Mr. Dingell remarked:

> It is quite clear that section 502(12) of the bill, in defining the term "discharge of a pollutant," does not in any way contemplate that the discharge be directly from the point source to the waterway. The situation is analogous to the court's holding in several cases, including the United States v. Esso Standard Oil Co. of Puerto Rico, 375 F.2d 621 (3d Cir. 1967), where a discharge from a port facility flowed "indirectly," that is by force of gravity over land to a waterway.

118 CONG. REC. 33,758 (1972).

[209] *See, e.g.*, United States v. Texas Pipeline Co., 611 F.2d 345 (10th Cir. 1979). One court has observed:

> For the purposes of the Act to be effectively carried into realistic achievement, the scope of its control must extend to all pollutants which are discharged into any waterway . . . where any water which might flow therein could reasonably end up in any body of water, to which or in which there is some public interest, including underground waters.

United States v. Phelps Dodge Corp., 391 F. Supp. 1181, 1187 (D. Ariz. 1975).

[210] *See, e.g.*, United States v. Weissman, 489 F. Supp. 1331 (M.D. Fla. 1980).

[211] This term was used in Kentucky v. Train, 9 E.R.C. 1281 (E.D. Ky. 1976), to describe the responsibility of the EPA to fix water quality standards for subsurface waters.

brief explanation that there are "substantial legal problems" with it.[212] As a practical matter, of course, it may be difficult to develop uniform effluent limitations for groundwater discharges which would be appropriate for all sources and locations. Uniform numeric standards are not required by the Clean Water Act, however, even for surface waters.[213] A more flexible approach to permitting could still enable the sort of comprehensive program which Congress envisioned.[214]

3) Protection of Surface and Groundwater Quality

To complement its end-of-the-pipe discharge limitations, the Clean Water Act calls for establishment of water quality standards[215] to help "restore and maintain" the integrity of the nation's waters.[216] The EPA has adopted regulations and guidelines to set standards for the quality of *surface* waters within each state.[217] Until recently it has had a policy to prevent the degradation of surface waters, even though cleaner than the standards require.[218] It has taken no action, however, to directly regulate groundwater quality. Although Section 304(a) requires the Administrator to develop "criteria" and "information" on the quality of groundwaters, it never has done so; nor has the Agency required that states set their own standards for groundwater quality. It has refused to impose any federal requirements, even where an aquifer is shown to have a clear connection to a surface body.[219]

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[212] Workshops, Appendices, *supra* note 6, at VI-20, 21.

[213] NRDC v. Costle, 568 F.2d 1369, 1379 (D.C. Cir. 1977). Where numeric effluent limitations are unfeasible, permit conditions may prescribe practices and procedures to minimize pollution. *Id.* at 1379. Such conditions are expressly authorized in § 402(a)(2).

[214] A number of state laws apply simply to "waters of the state," including groundwaters. SPDES programs in those states sometimes require permits for discharges to groundwaters. Surface Impoundments, *supra* note 68, at 138-144.

[215] CWA § 303(a)-303(d), 303(f)-303(h), 33 U.S.C. § 1313(a)-1313(d), 1313(f)-1313(h) (1976 & Supp. V 1981).

[216] CWA § 101(a), 33 U.S.C. § 1251(a) (1976).

[217] See *supra* notes 180-81.

[218] This nondegradation policy has been applied in the periodic review of state water quality standards under § 303(c). 40 C.F.R. §§ 35.1550(c)-(e) (1982). The policy is also described in 43 Fed. Reg. 29,588 (1978), and in Environmental Protection Agency, Guidelines for State and Areawide Water Quality Management Program Development (1976). Although existing water uses must be preserved, water cleaner than the 1983 fishable/swimmable standard in § 101(a)(2) may be degraded to that level as a result of "necessary and justifiable economic or social development." 40 C.F.R. § 35.1550(c), (e) (1982). CWA § 301(g), (h), added in 1977, would also permit some degradation.

In recently proposed changes to water quality rules, the Agency would abandon its nondegradation policy for surface waters, 47 Fed. Reg. 46,668 (1982). In the face of legislation which would codify existing water quality regulations, however, the Agency may withdraw its proposal. [14 Current Developments] Env't Rep. (BNA) 646 (1983).

The result, of course, is a system which fully protects neither surface nor groundwaters. Congress, however, clearly recognized the interdependence of these two resources in calling for a "comprehensive program" of protection.[220] Such a program necessarily includes the monitoring and control of pollution both on the surface and underground.

4) Other Clean Water Act Authority

Several other sections of the Clean Water Act have been employed by the EPA, either in the planning or funding of state programs, or for the prevention or cleanup of inadvertent discharges which could migrate to groundwaters. There has been no deliberate regulation, however, of surface water discharges which might contaminate groundwater supplies, or vice-versa.

Section 208(b) calls for each state to develop a continuing areawide waste treatment management planning process, including, among other things, "a process to control the disposal of pollutants on land or in subsurface excavations within such area to protect *ground* and surface water quality."[221] The Section 208 plan must describe best management practices (BMPs) selected by the local authority to control nonpoint sources of surface and groundwater contamination.[222] Funding for Section 208 planning has until recently provided a major impetus for state groundwater protection efforts,[223] but such funding now has been curtailed by the EPA.

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[219] Memorandum from EPA General Counsel to Director, Water Division, Region II (May 29, 1979) at 4. The General Counsel expressly rejected the holding in Kentucky v. Train, 9 E.R.C. 1281 (E.D. Ky. 1976), relying instead on legislative history to show that federal standards for groundwaters should not be required.

[220] CWA § 102(a). "Water moves in hydrologic cycles and it is essential that discharges of pollutants be controlled at the source." S. REP. No. 414, 92d Cong., 1st Sess. 77 (1971). In United States v. Ashland Oil & Transp. Co., 504 F.2d 1317 (6th Cir. 1974), the court declared that "Congress' clear intention . . . was to effect marked improvement in the quality of the total water resources of the United States, regardless of whether that water was at the point of pollution a part of a navigable stream." *Id.* at 1323.

[221] CWA § 208(b)(2)(K), 33 U.S.C. § 1288(b)(2)(K) (1976) (emphasis added). Section 208(b) also requires development of processes to identify and control pollution from agriculture, silvicultural, mining and construction sources, and salt water intrusion resulting from fresh water diversions, including groundwater extractions. Section 208(b)(2)(F)-208(b)(2)(I), 33 U.S.C. § 1288(b)(2)(F)-1288(b)(2)(I) (1976 & Supp. V 1981). These provisions roughly parallel the requirements in § 304(f), 33 U.S.C. § 1314(f) (1976 & Supp. V 1981) for publication of federal guidelines.

Early on, the EPA decided that § 208, 33 U.S.C. § 1288 (1976 & Supp. V 1981), plans had to reflect the Agency's antidegradation policy for surface waters. *See* 40 Fed. Reg. 55,341 (1975). It has not, however, used the process to apply that policy to groundwaters.

[222] Such practices are defined by the regulations only in the most general terms. *See* 40 C.F.R. § 35.1521-4(c)(1) (1982).

Section 201(g) authorizes funding for the construction of publicly owned treatment works which conform to approved Section 208 plans. Provision must be made for disposal of wastes from the treatment facility itself in a fashion that will not threaten underground water sources.[224] More broadly, Section 201(b) provides for "disposal of pollutants so that they will not migrate to cause water or other environmental pollution."[225] Thus, with or without funding, consideration must be given to alternative waste treatment techniques which will cause the least possible destruction to the environment, including groundwaters.[226]

Two sections require planning for accidental discharges which could affect groundwater. Section 304(e), adopted in 1977, calls for the development of best management practices for classes or categories of point sources to control plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage. The controls are aimed only at toxic or hazardous pollutants. Although the purpose is ostensibly to protect "navigable" waters, underground waters could also benefit from such efforts.[227] Such BMPs are only applicable as conditions in NPDES permits for point sources, however, and so could not affect a variety of nonpoint sources. Section 402(a)(2) also authorizes the Administrator to prescribe conditions for NPDES permits which could be fashioned to protect groundwaters in individual cases.[228]

Section 311 requires that on-shore facilities which may spill oil or hazardous substances on the ground, thus threatening groundwater supplies, adopt measures to prevent such spills or to clean them up if they occur.[229] Guidelines for Spill Prevention Control and Countermeasure (SPCC) plans are contained in EPA regulations for the oil industry,[230] but not yet for other kinds of facilities.[231] The same section mandates preparation of a National Contingency Plan to direct federal and state efforts when spills occur, to minimize their impact on the environment.[232]

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[223] Several examples are described in SHIFRIN & NOLAN, *supra* note 7, at 16.

[224] 40 C.F.R. § 35.1521-4(f) (1982). Disposal of such wastes must be coordinated with requirements of Subtitles C and D of RCRA. *Id.*

[225] 33 U.S.C. § 1281(b) (1976).

[226] In EDF v. Costle, 439 F. Supp. 980 (E.D.N.Y. 1977), the Agency refused, after extensive experiments, to allow onland disposal of wastes in order to protect a groundwater supply. It instead issued a NPDES permit for discharge into surface waters. *Id.* at 1001-02. The Administrator has published information on alternatives pursuant to § 304(d)(2) in ENVIRONMENTAL PROTECTION AGENCY, ALTERNATIVE WASTE MANAGEMENT TECHNIQUES FOR BEST PRACTICABLE WASTE TREATMENT (1975).

[227] The word "navigable" is omitted from the regulations, 40 C.F.R. § 125.102 (1982), where discharges must apply BMPs "for all activities which may result in significant amounts of those pollutants reaching waters of the United States." Criteria and standards for BMPs are found *id.* § 125, Subpart K.

[228] The Administrator may impose "such conditions as . . . are necessary to carry out the provisions of this Act," § 402(a)(1), 33 U.S.C. § 1342(e)(1) (1976), and so is not restricted to the limitations contained in § 304(e), 33 U.S.C. § 1314(f) (1976 & Supp. V 1981).

Finally, Section 504 gives the Administrator the authority to bring suit in an emergency to stop any discharge of pollutants which threatens the health or welfare of persons, or "to take such other action as may be necessary."[233] This section and similar provisions in the Safe Drinking Water Act and Resource Conservation and Recovery Act[234] have been used by the EPA a number of times to force the cleanup of materials which could destroy groundwater supplies. There still is considerable disagreement about whether these provisions are merely jurisdictional—a codification of the federal common law of nuisance[235]—and about whether these powers can be invoked by the EPA to deal with abandoned sites.[236] On a case-by-case basis, however, they have furnished powerful, flexible tools for quickly averting such threats.[237]

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[229] CWA § 311(j)(1)(C), 33 U.S.C. § 1321(j)(1)(C) (1976). "Hazardous substances" in this instance are those defined under § 311(b)(2)(A), 33 U.S.C. § 1321(b)(2)(A) (1976 & Supp. V 1981).

[230] 40 C.F.R. §§ 112.1-.7 (1982).

[231] Proposed regulations requiring SPCC plans for facilities with NPDES permits may be found at 43 Fed. Reg. 39,276 (1978). No regulations have even been proposed for facilities not requiring NPDES permits. Such regulations, when they are promulgated, are to require coordination of SPCCs with § 304(e) BMPs. *Id.*

[232] CWA § 311(c)(2), 33 U.S.C. § 1321(c)(2) (1976 & Supp. V 1981). The National Contingency Plan has recently been updated to satisfy requirements of the Superfund law, *infra*, text and notes at notes 362-372.

[233] 33 U.S.C. § 1364(a) (1976 & Supp. V 1981).

[234] The corresponding sections are SDWA § 1431(a), 42 U.S.C. § 300(a) (1976), and RCRA § 7003, 42 U.S.C. § 6973 (1976 & Supp. V 1981). CWA § 504 is concerned with a "pollution source or combination of sources [which] is presenting an imminent and substantial endangerment to the health of persons or to the welfare of persons where such endangerment is to the livelihood of such persons." 33 U.S.C. § 1364(a) (1976 & Supp. V 1981). RCRA § 7003 is broader in addressing threats to "health or the environment," and has been invoked more often. SDWA § 1431(a) concerns only a "contaminent which is present in or is likely to enter a public water system." 42 U.S.C. § 300(a) (1976). These provisions are examined in Skaff, *The Emergency Powers in the Environmental Protection Statutes: A Suggestion for a Unified Emergency Provision*, 3 HARV. ENVTL. L. REV. 298 (1979); Comment, *Hazardous Waste: EPA, Justice Invoke Emergency Authority*, 10 ENVTL. L. REP. (ENVTL. L. INST.) 10,034 (1980); Note, *Inactive or Abandoned Hazardous Waste Disposal Sites: Coping With a Costly Past*, 53 S. CAL. L. REV. 1709 (1980).

[235] If a section merely reflects the common law of nuisance, then the action will be subject to all the defenses available in such cases. For decisions holding that the provisions are merely jurisdictional, see United States v. Midwest Solvent Recovery, Inc., 484 F. Supp. 138 (N.D. Ind. 1980); United States v. Solvents Recovery Service of New England, 496 F. Supp. 1127 (D. Conn. 1980). *But see* United States v. Price, 523 F. Supp. 1055 (D.N.J. 1981); United States v. Vertac Chemical Corp., 489 F. Supp. 870 (E.D. Ark. 1980).

[236] *Compare* United States v. Price, 523 F. Supp. 1055 (D.N.J. 1981) (statute does not

Together, these provisions have the potential to form part of an integrated program for groundwater protection. That potential has been recognized by the EPA,[238] but not yet fully realized.

5) Potential for the Clean Water Act

The language of the Clean Water Act is unfortunately murky on a number of points. There is, however, plenty of evidence indicating that its regulatory apparatus was meant to apply with equal force to ground and surface waters. For example, during House debate on the 1972 Amendments, Representative Kemp stated that "[f]or the first time groundwaters have been given the same emphasis as surface waters . . . . [The Act] is an important step forward in the protection of the underground environment."[239] In addition, several courts have declared that in enacting the 1972 Amendments, Congress intended to "extend the Act's jurisdiction to the Constitutional limit,"[240] which clearly would encompass groundwater protection.

It would be extremely convenient to use the existing NPDES machinery[241] to control *all* groundwater discharges from *any* source. In the process, overlaps and gaps in coverage under the other federal acts would be avoided. The Consolidated Permitting program described above[242] furnishes a useful model. Until the EPA tests the limits of its authority, of course, we can not be certain how far the Act extends. A citizen's suit under Section 505 to require the Administrator to perform a nondiscretionary duty to control groundwater pollution could provide the catalyst for settlement of this question. In the meantime, if Congress would clarify its intent, it could make the whole regulatory and enforcement program unquestionably applicable to groundwater by simply deleting the word "navigable" wherever it appears in the Act.

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authorize general cleanup but does grant relief from further leaking into groundwater), *with* United States v. Waste Industries, Inc., No. 80-4-Civ-7 (E.D.N.C. 1983) (RCRA § 7003 does not apply to abandoned sites).

[237] In these cases, the EPA need not comply with various formal requirements of the National Contingency Plan, as it would under CWA § 311 or under the Superfund Law. *See infra* text and notes at notes 364-65.

[238] WORKSHOPS, APPENDICES, *supra* note 6, at VI.

[239] 118 CONG. REC. 33,766 (1972), reported in *U.S. Steel*, 556 F.2d 822 at 852-53.

[240] For recent cases, see Avoyelles Sportsmen's League v. Alexander, 511 F. Supp. 278, 285 (W.D. La. 1981), and cases cited therein.

[241] *See supra* text and notes at notes 180-84.

[242] *See supra* text and notes at notes 92-100.

B. Safe Drinking Water Act

Although the primary purpose of the Safe Drinking Water Act (SDWA)[243] is the establishment of state programs to regulate "public water systems,"[244] it also contains two strategies for protecting underground sources of drinking water. One is contained in the Underground Injection Control (UIC) program,[245] which regulates "the subsurface emplacement of fluids by well injection."[246] The other, contained in Section 1424(e) (known as the Gonzalez Amendment), provides some protection for "sole source" aquifers,[247] which are aquifers found to be the sole or primary drinking water source for a particular region.

The UIC program enables states to adopt their own regulations to prohibit any underground injection, except those authorized by permit or rule.[248] No injection may be allowed which would endanger "drinking water sources."[249] For this purpose, an injection is proscribed if it:

> may result in the presence in underground water which supplies or can reasonably be expected to supply any public water system of any contaminant, and if the presence of such contaminant may result in such systems not complying with any national primary drinking water regulation or may otherwise adversely affect the health of persons.[250]

If a state fails to adopt an approved UIC program, or having adopted one fails to enforce it, the EPA must install its own program.[251]

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[243] 42 U.S.C. § 300f-300j (1976 & Supp. V 1981). Textual references hereinafter are to section numbers of the Act as enacted by Congress. An excellent history may be found in Douglas, *Safe Drinking Water Act of 1974—History and Critique*, 5 B.C. ENVT'L AFF. L. REV. 501 (1976).

[244] "The term 'public water system' means a system for the provision to the public of piped water for human consumption if such system has at least fifteen service connections or regularly serves at least twenty-five individuals . . . ." SDWA § 1401(4), 42 U.S.C. § 300f(4) (1976).

[245] *Id.* §§ 1421-1424(d), 1425, 42 U.S.C. § 300h (1976 & Supp. V 1981). Regulations for the program are found at 40 C.F.R. §§ 122-124, 146 (1982).

[246] SDWA § 1421(d)(1), 42 U.S.C. § 300h(d)(1) (1976 & Supp. V 1981).

[247] This second strategy is described *infra* text and notes at notes 272-277.

[248] *Id.* §§ 1421-1422, 42 U.S.C. § 300h-300h(1) (1976 & Supp. V 1981).

[249] *Id.* § 1421(b)(1), 42 U.S.C. § 300h(b)(1) (1976 & Supp. V 1981).

[250] *Id.* § 1421(d)(2), 42 U.S.C. § 300h(d)2 (1976). Specifications for the design of injection wells, and conditions for their operation, either by permit or by rule, are set forth at 40 C.F.R. § 146 (1982).

[251] SDWA § 1422(c), 42 U.S.C. § 300h-1 (1976). The EPA recently announced proposed programs for each of 23 states and territories still lacking approved programs. 48 Fed. Reg. 40,098 (1983).

The EPA has now decided to rely entirely upon the UIC program to control all types of subsurface waste disposals.[252] Such reliance seems unwarranted for several reasons. First, by its terms, the program applies only to "underground injections."[253] Under the EPA's interpretation of this term, the disposal of wastes either in a hole wider than it is deep, or on the surface, will not require a UIC permit.[254] Furthermore, the program applies only to the disposal of "fluids."[255] Thus, emplacement of solid materials (even soluble ones) would seem to fall outside the reach of the program, even if they were placed directly into an aquifer used to supply a public water system.[256]

The Agency has further limited the applicability of the UIC program. The availability of a UIC permit depends upon the effect of an injection on an "underground source of drinking water" (USDW).[257] The Agency has recently decided that only an aquifer which currently supplies or has enough water to supply a public water system will be classified as a USDW.[258] Thus many private wells, especially those in rural areas, are left exposed to contamination. By concentrating solely on public water supplies, the Agency seems to have ignored the broader mandate of Section 1421(d)(2) to prevent groundwater contamination which "may otherwise adversely affect the health of persons."[259]

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[252] Memorandum from EPA General Counsel, *supra* note 200.

[253] SDWA § 1421(b)(1), 42 U.S.C. § 300h(b)(1) (1976 & Supp. V 1981).

[254] "*Underground injection* (UIC) means a well injection . . . *Well injection* (UIC) means the subsurface emplacement of 'fluids' through a bored, drilled, or driven 'well'; or through a dug well, where the depth of the dug well is greater than the largest surface dimension." 40 C.F.R. § 122.3 (1982). *See also* 40 C.F.R. § 122.31(d)(1)(ii) (1982).

Congress recognized the threat to underground drinking water sources from surface impoundments of fluids when, in SDWA § 1442(a)(8)(c), it ordered a study of "ponds, pools, lagoons, pits, or other surface disposal of contaminants in underground water recharge areas." The results may be found in EPA, SURFACE IMPOUNDMENTS, *supra* note 68. An updated study in draft form has been leaked to the press, [13 Current Developments] ENV'T REP. 1503 (BNA) (1983).

[255] "*Fluid* (UIC) means any material or substance which flows or moves whether in a semisolid, liquid, sludge, gas, or any other form or state." 40 C.F.R. § 122.3 (1982).

[256] Under § 1431 of the Act, however, the Administrator may move to prevent or abate such an action if the material is present in or is likely to enter a public water system and "may present an imminent and substantial endangerment to the health of persons." 42 U.S.C. § 300 (1976 & Supp. V 1981). *See supra* note 234. In some cases disposal of solid hazardous wastes in wells will be covered by the Resource Conservation and Recovery Act. 40 C.F.R. § 122.45 (1982).

[257] *Id.* § 122.31(d). The EPA initially decided that each aquifer within a state should be regarded as a USDW if it supplied drinking water for human consumption *or* if it contained fewer than 10,000 mg/1 of total dissolved solids. This meant that every aquifer within each state, except for the dirtiest ones, would be protected. 40 C.F.R. § 122.3 (1981).

[258] 40 C.F.R. § 122.3 (1982). H.R. 3200, 98th Cong., 1st Sess. (1983), would amend the SDWA to expand the definition to include a source which "[m]ay reasonably be anticipated to be capable of supplying any public water system if such system utilized technologically advanced treatment which may become available."

In addition, EPA regulations provide that an aquifer may be "exempted" from UIC protection if it does not currently serve as a source of drinking water, and cannot or will not be so used in the future because:

> 1) It is mineral, hydrocarbon, or geothermal energy producing, or is expected to become so;
> 2) It is at a depth or location making its use for drinking water economically or technologically impractical;
> 3) It is so contaminated that it would be impractical to render it fit for human consumption; or
> 4) It contains between 3,000 and 10,000 mg/1 of dissolved solids.[260]

There is, however, no express authority for such an exemption in the Act. Further, by exempting aquifers that are already dirty, of course, we may simply be excusing the worst current groundwater polluters from compliance with the program. Such an exemption also ignores the possibility that a polluted acquifer may be cleaned up or may even cleanse itself if left alone. The decision to sacrifice a potential drinking water source for mineral or energy production, or for waste disposal, requires a confidence about future conditions which probably is not justified.[261]

Finally, the EPA has developed a classification scheme for the estimated 500,000 active injection wells in this country.[262] Each well is assigned to one of five categories, according to what is put into it or "injected", and according to its proximity to a drinking water source.[263] General standards have been developed for the design and operation of four of the five categories of wells,[264] while individual siting and other specifications are set for each well.[265] There is wide disagreement, both inside and outside the Agency, about the technical soundness of these requirements. For example, the decision to rely on the Primary Drinking Water Standards as groundwater quality criteria for permitting well injections[266] has been criticized.[267] Such standards are designed to take into account the *cost* of treating water for use in a public water system,[268] while the UIC program requires that decisions be made finally to protect the "health of persons," without any mention of cost.[269] In any event, the standards cover only a few contaminants[270] and are thought by some to be too lax to adequately protect the public health.[271]

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[259] 42 U.S.C. § 300h(d)(2) (1976 & Supp. V 1981).

[260] 40 C.F.R. § 146.04 (1982). An aquifer also may be exempted if it is located over a Class III well mining area subject to subsidence or catastrophic collapse. *Id.* No aquifer is an "exempted aquifer" until it has been affirmatively so designated. *Id.* § 122.31(d).

[261] "Generally," the EPA suggests, "the exceptions allowed in the UIC program will come into play, if at all, with regard to deeper aquifers . . . and then only if the portions of the aquifer do not have real potential to serve as drinking water sources." 44 Fed. Reg. 23,743 (1979). Agency policy on exemptions is explained further at 48 Fed. Reg. 40,098 (1983).

[262] The classification scheme and its consequences are described at 40 C.F.R. §§ 122.31(d)-.34 (1982).

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[263] The classes may be summarized as follows:

CLASS	FUNCTION	NUMBER OF WELLS
I	Industrial, municipal or hazardous waste disposal, beneath the deepest stratum containing a drinking water source within 1/4 mile of well bore.	400
II	Disposal of non-hazardous fluids brought to the surface in connection with oil and gas production or to increase recovery of oil or gas.	140,000
III	Injection of fluids for solution mining of minerals.	8,000
IV	Hazardous or radioactive waste disposal into or above strata that contain drinking water sources within 1/4 mile.	5,000-10,000
V	All other wells, *e.g.*, air condition-return flow wells	250,000-500,000

The numbers of wells appear with slightly different definitions in WORKSHOPS, APPENDICES, *supra* note 6, at V-10, 11.

[264] 40 C.F.R. §§ 146.5-.52 (1982); 47 Fed. Reg. 32,129 (1982). Because of their great number and diversity, regulations to cover Class V wells have not yet been established, even though as a group such wells may pose a great threat to the public and the environment.

[265] 40 C.F.R. §§ 146.11-.52 (1982).

[266] *Id.* § 122.34.

[267] *See* ENVIRONMENTAL DEFENSE FUND, *supra* note 9, at 26-32.

[268] SDWA § 1412(b)(3), 42 U.S.C. § 300g-1(b)(3) (1976). The standards are set forth at 40 C.F.R. §§ 141.1-.40 (1982).

[269] *See supra* text at notes 250.

[270] Maximum contaminant levels have been established for only 10 inorganic chemicals, 7 organic chemicals, turbidity, coliform bacteria and some radioactive materials. 40 C.F.R. §§ 141.11-.16 (1982). The legislative history makes it clear that the protection of the Act should extend to "any injected substance (or derivative thereof), whether or not that substance is a contaminant subject to national primary drinking water regulations." H.R. REP. No. 1185, 93rd Cong., 2d Sess., *reprinted in* 1974 U.S. CODE CONG. & AD. NEWS 6481.

[271] The failure by the EPA to adopt any standards for some dangerous pollutants, and the

Under the second groundwater protection strategy contained in the SDWA,[272] Section 1424(e),[273] if the Administrator finds that an aquifer is the sole or principal drinking water source for an area, no federally assisted project may be undertaken which could create a significant hazard to public health by contaminating that aquifer through a recharge zone.[274] Although the amendment was added for the particular purpose of preventing development of a large housing project overlying the Edwards Aquifer north of San Antonio,[275] at least ten aquifers nationwide now have received "sole source" designations.[276] The utility of this provision may be hampered by the fact that several of its operative terms are not clearly defined,[277] and there is as yet no indication how vigorously the EPA will exercise its authority to control development within the designated areas.

The Safe Drinking Water Act provides important safeguards for some groundwater sources. Unfortunately, however, it offers no protection, except incidentally, for agricultural or industrial groundwater users, or for surface water appropriators hydrologically connected to polluted aquifers. Moreover, as discussed above, because of the EPA's restricted interpretation of its mandate under this statute, even the limited potential of the Act for protection of public health has not been realized.

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failure to adopt more stringent standards for others, were challenged unsuccessfully in Environmental Defense Fund v. Costle, 578 F.2d 337 (D.C. Cir. 1978). One proposed amendment to the Act, H.R. 3200, 98th Cong., 1st Sess. (1983), would require the EPA to set standards for 14 volatile organic chemicals and for all toxic materials listed under CWA § 307.

[272] It is suggested that a third strategy exists in the statutory mandate to promulgate drinking water regulations, prescribing "technology, treatment techniques, and other means." SDWA §§ 1412(a)(2), (b)(3), 42 U.S.C. §§ 300g-1(a)(2), 300g-1(b)(3) (1976). *See* Tripp & Jaffe, *Preventing Groundwater Pollution: Towards a Coordinated Strategy to Protect Critical Recharge Zones*, 3 Harv. Envtl. L. Rev. 1, 18 (1979). The EPA, however, has not seized upon this broad language to control groundwater discharges.

[273] 42 U.S.C. § 300h-3(e) (1976 & Supp. V 1981). The Gonzalez Amendment is described generally in Hemphill, *Section 1424(e) of the Safe Drinking Water Act: An Effective Measure Against Groundwater Pollution?*, 6 Envtl. L. Rep. (Envtl. L. Inst.) 50,121 (1976); Wheatley and Castaneda, *Protection of Underground Drinking Water Supplies—The Gonzalez Amendment to the Safe Drinking Water Act*, 8 St. Mary's L.J. 40 (1976).

[274] SDWA § 1424(e), 42 U.S.C. § 300h-3(e) (1976). A recharge area (or zone) is "[a]n area in which an aquifer is recharged by force or gravity, usually where a permeable layer lies close to the surface." 7 Waters and Water Rights 308 (R. Clark, ed. 1976).

[275] Wheatley & Castaneda, *supra* note 273. The same project was the subject of earlier litigation in Sierra Club v. Lynn, 502 F.2d 43 (5th Cir. 1974), where the court remarked, "[t]he developer must meet any state or federal standards that are established in the future. More importantly, the developer must act to prevent the (project) from degrading the existing water quality in the aquifer." *Id.* at 63-64.

[276] Regulations for only one aquifer, the Edwards Aquifer, have been published, 40 C.F.R. § 149 (1982), but they may provide a pattern for the others.

[277] "Federal assistance" is defined in the statute as "a grant contract, loan guarantee, or

C. Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA),[278] like the Safe Drinking Water Act, is intended to complement the Clean Water Act by controlling a particular major source of groundwater pollution, namely the "disposal"[279] of "solid wastes"[280] in the environment.[281] The Act is intended to halt the open dumping of all wastes,[282] to prevent the mishandling of hazardous wastes which could especially endanger human health or the environment,[283] and to encourage the recycling of materials.[284] As with other Congressional efforts, however, the language of the Act itself and its limited interpretation by the EPA have prevented the full realization of its goals.

1) Elimination of Open Dumps

Several RCRA provisions were designed to eliminate open dumps, which threaten groundwater supplies. Both by statutory design, and

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otherwise." This has been taken to mean that a project of the federal government itself, or of a federal licensee, would not be affected. 42 Fed. Reg. 51,620 (1977). It is not clear what percentage of the drinking water for an area must be furnished before an aquifer may be characterized as "sole or principle" source. Also, the meanings of "contaminate" and "significant hazard" are not spelled out.

[278] 42 U.S.C. §§ 6901-6987 (1976 & Supp. V 1981). Textual references hereinafter are to sections of the Act as passed by Congress.

[279] The term "disposal" is broadly defined in RCRA § 1004(3), to mean the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwaters.

[280] 42 U.S.C. § 6903(3) (1976). "Solid waste" includes "[g]arbage, refuse, sludge . . . and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities." RCRA § 1004(27), 42 U.S.C. § 6903(27) (1976). A survey by the EPA has revealed the existence of more than 180,000 pits, ponds and lagoons around the country whose liquid contents would constitute solid waste for this purpose. Ninety percent of them threaten groundwater supplies; 15% contain waste that may be considered hazardous. [13 Current Developments] ENV'T REP. (BNA) 1503 (1983).

[281] "[T]he approach taken by this legislation eliminates the last remaining loophole in environmental law, that of unregulated land disposal of discarded materials and hazardous wastes." H. REP. NO. 1491, 94th Cong., 2d Sess. 4 (1976), *reprinted in* 1976 U.S. CODE CONG. & ADM. NEWS 6241. The genesis of the Act is described in Kovacs & Klucsik, *The New Federal Role in Solid Waste Management: The Resource Conservation and Recovery Act of 1976*, 3 COLUM. J. ENVTL. L. 205, 216-20 (1977).

[282] RCRA §§ 1003, 1008, and Subtitle D, 42 U.S.C. §§ 6902, 6907, 6941-6949 (1976 & Supp. V 1981).

[283] *Id.* § 1003 and Subtitle C, 42 U.S.C. §§ 6902, 6921-6931 (1976 & Supp. V 1981).

[284] *Id.* §§ 1003, 5001-5004, 6002, 8005-8006, 42 U.S.C. §§ 6902, 6951-6954, 6962, 6985-6986 (1976 & Supp. V 1981).

by EPA interpretation of those provisions, however, the effectiveness of RCRA in eliminating open dumps is in doubt.

RCRA Section 1008[285] calls for the publication of "suggested guidelines" for management of the four billion tons of solid wastes generated in this country every year.[286] The EPA's guidelines for land disposal, the most threatening source of groundwater contamination, consist of criteria and operating standards for "sanitary landfills," designed primarily for municipal wastes.[287] Hazardous, agricultural, and mining wastes are expressly excluded from their coverage,[288] and while the guidelines set forth procedures for protection of ground and surface waters used as drinking water supplies,[289] they are mandatory for federal installations only, and are merely recommended to the states.[290]

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[285] 42 U.S.C. § 6907 (1976 & Supp. V 1981).

[286]

> [T]he suggested guidelines shall—(1) provide a technical and economic description of the level of performance that can be attained by various available solid waste management practices (including operating practices) which provide for the protection of public health and the environment; (2) . . . describe levels of performance, including appropriate methods and degrees of control, that provide at a minimum for (A) protection of public health and welfare: (B) protection of groundwaters and surface waters from leachates . . . .

RCRA § 1008(a), 42 U.S.C. § 6907(a) (1976 & Supp. V 1981).

[287] 40 C.F.R. § 241 (1982).

> The recommended procedures are based on the practice of sanitary landfilling municipal solid waste . . . . Sanitary landfilling is the most widely applied environmentally acceptable land disposal method. If techniques other than the recommended procedures are used, or wastes other than municipal solid wastes are disposed, it is the obligation of the proposed facility's owner and operator to demonstrate to the responsible agency in advance by means of engineering calculations and data that the techniques employed will satisfy the requirements.

Id. §241.100(b). Presumably, this means that the disposal of other types of wastes or the use of alternative methods must have no greater or different impact upon the environment than a sanitary landfill would disposing of municipal wastes alone. The guidelines, however, contain no further instructions about such alternatives.

[288] *Id.* § 241.100(a). The reason given is lack of sufficient information upon which to base recommended procedures. Nothing, however, could prevent the EPA from suggesting avoidance of *any* procedure which would have more than a stated minimum impact upon the environment, e.g., through violation of a groundwater quality standard.

[289] The guidelines provide that:

> The location, design, construction, and operation of the land disposal site shall conform to the most stringent of applicable water quality standards established under the Clean Water Act. In the absence of such standards, the land disposal site shall . . . provide adequate protection to ground and surface waters used as drinking water supplies.

Id. § 241.204-1. In the absence of federal groundwater quality standards, "adequate protection" for groundwaters is said to be provided by the Primary Drinking Water Standards. *Id.* *See supra* text and notes at notes 266-71.

[290] 40 C.F.R. § 241.100(c) (1982).

Section 4005(a) prohibits the "open dumping" of solid or hazardous wastes.[291] An open dump is any open waste facility which is neither a hazardous waste facility (regulated under Subtitle C), nor a sanitary landfill which meets performance standards under Section 4004(a).[292] The Administrator was directed by Section 4005(b) to publish an inventory of all open dumps in the country, using these criteria.[293] After two years, however, with some 2015 dumps identified,[294] the Agency decided not to allocate any more funds to the inventory project, and work on it seems to have ground to a halt.[295] In addition, the impact of the Section 4005(a) dumping prohibition is further limited by the EPA position that the provision may be enforced only by the states or by individuals under the Act's citizen suit provision, and not by the federal government directly.[296]

Section 4004(a) of RCRA, the sanitary landfill provision, declares that a facility will qualify as a sanitary landfill only if it presents no reasonable probability of adverse effects on health or the environment. EPA criteria established under Section 4004(a), however, address only the protection of drinking water sources.[297] Even those sources may be degraded to the levels of the National Primary Drinking Water Standards,[298] and uses other than human consumption are afforded no protection at all.[299] Nor is there any restriction on a groundwater discharge which could destroy surface water supplies, unless such a discharge can be said to require a NPDES permit.[300]

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[291] 42 U.S.C. § 6945(a) (1976 & Supp. V 1981).

[292] RCRA § 1004(14), 42 U.S.C. § 6903(14) (1976 & Supp. V 1981).

[293] The EPA took the position that the inventory should be compiled by the states, using their own authority and resources. 44 Fed. Reg. 45,066 (1979).

[294] 47 Fed. Reg. 18,425 (1982).

[295] GENERAL ACCOUNTING OFFICE, SOLID WASTE DISPOSAL PRACTICES: OPEN DUMPS NOT IDENTIFIED, STATES FACE FUNDING PROBLEMS (1982). The third year's inventory, 48 Fed. Reg. 28,327 (1983), brought the total to only 2,081. [14 Current Developments] ENV'T REP. (BNA) 297 (1983).

[296]

> The open dumping prohibition is a provision of Federal law which stands on its own, separate from the State planning program. In conjunction with the citizen suit provision, the open dumping prohibition creates a Federal cause of action allowing citizens and States to sue in Federal court for damaging solid waste management practices.

44 Fed. Reg. 45,072 (1979). The ability of a citizen plaintiff to maintain an action under this prohibition was confirmed in O'Leary v. Moyer's Landfill, 523 F. Supp. 642 (1981).

[297] 40 C.F.R. § 257.3-4(b) (1982).

[298] *Id.* § 257.3-4(c)(2). *See supra* text and notes at notes 266-71. Those standards are set forth for this purpose at 40 C.F.R. pt. 257, App. I (1982).

[299] The EPA explains that in spite of the broader mandate of RCRA § 4004(a) to set criteria which would protect the environment, its rules concern only the water's use for drinking, because this is "first among several objectives in protecting groundwater quality," and because the Agency has not established standards for other uses. 44 Fed. Reg. 53,445 (1979).

The RCRA open dump provisions leave primary responsibility for achieving its goals with the states. Total reliance has been placed on the states to develop their own solid waste management plans to prohibit open dumps, facilitate resource recovery, and coordinate regional planning for waste disposal.[301] Only those states with EPA approved plans, conforming to federal guidelines and criteria, are eligible to receive federal assistance to carry out those plans.[302] Federal budget cuts, however, have eliminated funds for such assistance, and the Act contains no other direct incentive for states to adopt their own comprehensive plans.

Even states with approved plans may not adequately protect the public health, since landfills granted permits by the states are not required by federal regulations to monitor leachates from landfill sites,[303] and total reliance is, therefore, placed on landfill operators to identify and exclude waste materials which should not be deposited in sanitary landfills.[304] The problem is compounded by the fact that "small generators" of hazardous wastes are free to dispose of their wastes in such facilities.[305]

2) Management of Hazardous Wastes

In enacting RCRA, Congress determined that certain wastes, because of the special danger they present to human health or the environment, require more direct regulation by the federal government.[306] Thus, it provided in Subtitle C of RCRA that each state should develop its own program to control hazardous wastes, applying minimum federal standards, or suffer the EPA to install a federal program.[307] The generation of waste material identified as hazardous must be reported by its generator[308] to the EPA, and its transportation and handling must be monitored until it finally is properly disposed of.[309] Thus, the material is tracked from "cradle to grave."[310] As with the Clean Water Act and the Safe Drinking Water Act, however, the EPA has not yet recognized the full potential of the Act to protect groundwater supplies, and it has been extremely slow in implementing its provisions.[311]

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[300] 40 C.F.R. § 257.3-3 (1982).

[301] "At this time federal preemption of this problem is undesirable, inefficient, and damaging to local initiative . . . . [T]he provisions of this legislation, specifically do not authorize the federal government to take over the responsibility for discarded materials disposal planning." H.R. REP. No. 1491, 94th Cong., 2d Sess. 33 (1976). Requirements for EPA approval of state plans are set forth in 40 C.F.R. § 256 (1982). At this writing about 20 states have approved plans.

[302] RCRA § 4007(b), 42 U.S.C. § 6947(b) (1976). The Administrator must review approved plans from time to time, and must withdraw approval (and financial assistance) if a plan no longer meets the minimum requirements described in regulations promulgated under RCRA § 4007(a), 42 U.S.C. § 6947(a) (1976). Federal assistance is available to develop waste management programs in rural communities, whether or not a state plan has been approved. RCRA § 4009, 42 U.S.C. § 6949 (1976 & Supp. V 1981).

[303] 40 C.F.R. § 256.22(b)(2) (1982).

[304] *Id.*

[305] *See infra*, text and notes at notes 319-23.

[306] RCRA § 1002(b)(5), 42 U.S.C. § 6901(b)(5) (1976).

Materials are deemed to be hazardous if they may cause or contribute to increases in mortality or illness, or pose a substantial hazard to human health or the environment.[312] The EPA has prepared a list of some 743 substances which have these qualities.[313] This list is intended to describe the most common and threatening waste materials and process wastes.[314]

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[307] Authorized state programs are described in RCRA § 3006 and in 40 C.F.R. § 123 (1982). Fewer than 40 states have any interim authorization under § 3006(c) to administer their own programs, and it is feared that many states will fail to receive final authorization before January 26, 1985, when program responsibility will revert to the EPA. State programs, both approved and otherwise, are described in National Conf. of State Legislatures, Hazardous Waste Management: A Survey of State Legislation 1982 (1982).

[308] RCRA § 3010(a), 42 U.S.C. § 6930 (1976 & Supp. V 1981). A "generator" is defined by the regulations as "any person, by site, whose act or process produces hazardous waste identified or listed in Part 261 of this chapter or whose act first causes a hazardous waste to become subject to regulation." 40 C.F.R. § 260.10 (1982).

[309] RCRA §§ 3002-3004, 42 U.S.C. §§ 6922-6924 (1976 & Supp. V 1981).

[310] The RCRA hazardous waste program is described in S. Epstein, L. Brown, & C. Pope, Hazardous Waste in America (1982); D. Weinberg, G. Goldman, and S. Briggum, Hazardous Waste Regulation Handbook—A Practical Guide to RCRA and Superfund (1982); U.S. Office of Technology Assessment, Technologies and Management Strategies for Hazardous Waste Control 268-99 (1983); Eckhardt, *Unfinished Business of Hazardous Waste Control*, 33 Baylor L. Rev. 253 (1981); Friedland, *New Hazardous Waste Management System: Regulation of Wastes or Wasted Regulation?*, 5 Harv. Envtl. L. Rev. 89 (1981); Ganet, *Hazardous Waste Management Under the RCRA—An Overview of the Statute and EPA's Current Program*, 13 Nat. Resources Newsletter 1 (1981); Wilhelm, *Regulation of Hazardous Waste Disposal: Cleaning Up the Aegean Stables with a Flood of Regulations*, 33 Rutgers L. Rev. 906 (1981); Worobec, *Analysis of the Resource Conservation and Recovery Act*, 11 Env't Rep. (BNA) 633 (1980); and Comment, *EPA Issues RCRA's 'Cradle-to-Grave' Hazardous Waste Rules*, 10 Envtl. L. Rep. (Envtl. L. Inst.) 10,130 (1980).

[311] Those regulations which have been published are set forth at 40 C.F.R. §§ 122-124, 260-265 (1982). Regulations for Subtitle C of RCRA were to have been promulgated by April 21, 1978. When this deadline passed, a suit by environmental groups and the state of Illinois resulted in the due date being extended by two years to April 1980. Illinois v. Costle, 12 E.R.C. 1597 (D.D.C. 1979). Nevertheless, final regulations for identification and listing of hazardous wastes and for the manifest system were not published until May 19, 1980, 45 Fed. Reg. 33,066 (1980), and rules for land disposal were finally promulgated on July 26, 1982, 47 Fed. Reg. 32,274 (1982). The history of litigation over the delayed regulations is traced in Comment, *supra* note 251; and in Bromm, *EPA's New Land Disposal Standards*, 12 Envtl. L. Rep. (Envtl. L. Inst.) 15,027 (1982).

[312] RCRA § 1004(5), 42 U.S.C. § 6903 (1976).

If a particular solid waste does not appear on the EPA list, the generator is responsible for determining whether it is hazardous according to its toxicity, ignitability, corrosivity, or reactivity.[315] Characteristics such as carcinogenicity and mutagenicity need not be considered by the generator, although such qualities are counted in the EPA's listing process.[316] Moreover, a generator need not perform actual tests on an unlisted waste if he can declare with "certainty" that it is not hazardous, based upon his knowledge of the materials and processes.[317] It may be safely assumed that few cost-conscious plant managers will happily embrace the regulatory burden which follows from characterization of their wastes as "hazardous," and that many potentially dangerous materials will consequently escape regulation under Subtitle C.[318]

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[313] Specific hazardous wastes are listed at 40 C.F.R. §§ 261.30-.33 (1982).

[314] Criteria for listing may be found at 40 C.F.R. § 261.11 (1982). Although regulation cannot be avoided by mixing a hazardous waste with some other waste, unless the mixture exhibits no hazardous characteristics, *id.* § 261.3, the handling of materials listed in § 261.33 will be regulated only if they are in the form of "commercial chemical products," and not merely constituents of other wastes. O'Leary v. Moyer's Landfill, Inc., 523 F. Supp. 642, 656-657 (1981).

Although the organic chemicals industry is responsible for about 60% of the nation's hazardous waste, only a portion of such wastes are listed. The EPA has set as a high priority the listing of additional materials, including pesticides, dyes and pigments, and other chlorinated organics. 47 Fed. Reg. 55,880 (1982).

[315] 40 C.F.R. §§ 262.10, 261.20-.24 (1982).

[316] RCRA § 3001(a) provides that criteria for identifying the characteristics of hazardous waste, and for listing hazardous waste, should take into account "toxicity, persistence, and degradability in nature, potential for accumulation in tissue, and other related factors such as flammability, corrosiveness, and other hazardous characteristics." 42 U.S.C. § 6921(a) (1976). The EPA explains that an expanded set of characteristics for testing unlisted wastes would be impractical, since the tests would be beyond the capabilities of most generators. *See* 45 Fed. Reg. 33,105 (1980) and 40 C.F.R. § 261.10 (1982), setting forth criteria for identification of characteristics. Instead of placing the public at risk, however, the generator should be required to assume whatever burden is necessary to prove that its waste is nonhazardous.

[317] 40 C.F.R. § 262.11(c)(2) (1982).

[318] Individual generators may also petition to have a listed material declared nonhazardous in a particular setting, by showing that the material possesses none of the characteristics which caused it to be placed on the list. 40 C.F.R. § 260.22 (1982).

The Act itself contains exemptions of indeterminate duration for mining wastes, ash and other wastes from fossil fuel combustion, and fluid wastes from the production of oil, gas or geothermal energy, RCRA § 3001(b), 42 U.S.C. § 6921(b) (1976 & Supp. V 1981), even though such materials may be extremely dangerous when released in the environment. EPA regulations provide further exemptions for a variety of other materials, including household wastes and agricultural wastes returned to the soil as fertilizers. 40 C.F.R. § 261.4 (1982).

Due to enforcement difficulties,[319] the EPA has decided to exempt from regulation under this program any generators of up to 1000 kilograms per month of most hazardous wastes, provided such wastes are treated or disposed of in an approved hazardous waste management facility or a permitted sanitary landfill.[320] Such an exemption is not contemplated in the Act itself. Although ninety-one percent of all hazardous waste generators will thus escape direct regulation, the EPA estimates that the remaining nine percent of generators produce ninety-nine percent of all hazardous wastes.[321] Yet, because some waste materials are dangerous in exceedingly small amounts, this exemption is bound to facilitate the destruction of many groundwater supplies.[322] Given the real limits on enforcement capabilities, regulation of small generators by rule, rather than by permit, may be temporarily necessary. Once any waste is identified as hazardous, however, it should be delivered to a facility capable of properly disposing of it, instead of entrusting it to a sanitary landfill.[323]

Hazardous wastes which are not reused or recycled,[324] and not exempted by the small generator rules, must be disposed of in an approved facility, whether on the generator's premises or elsewhere.[325] They may, however, be burned as fuel according to current rules, even though such burning may create a serious air pollution problem.[326]

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[319] The EPA earlier estimated that there are 760,000 individual generators of hazardous waste. 45 Fed. Reg. 33,102 (1980). Now it says that reducing the small generator exemption to 100 kg/mo would affect 13,000 additional generators; reducing it to zero would affect 560,000 additional generators. [13 Current Developments] Env't Rep. (BNA) 887 (1982).

[320] 40 C.F.R. § 261.5 (1982). The exemption is only 1 kg/mo for any of 122 "acute hazardous wastes," *Id.* § 261.5(e)(1), more for certain other materials. *Id.* § 261.5(e)(2).

[321] 45 Fed. Reg. 33,102 (1980). A study by the Office of Technology Assessment, however, says the small generator exemption may exclude five percent of the hazardous waste stream, rather than one percent, as EPA suggests. [13 Current Developments] Env't Rep. (BNA) 498 (1982).

[322] On the first page of its Proposed Ground Water Protection Strategy (1980), the EPA reports that the dumping of a half gallon per day (about 54 kilograms per month) of solvents has, over time, rendered unusuable one-third of the municipal water supply for the 18,000 people of South Brunswick, New Jersey.

[323] Although approved sanitary landfills are supposed to accept only wastes for which they are designed, such a facility designed to receive hazardous waste need not conform to standards for hazardous waste management facilities. 40 C.F.R. §§ 264.1(g)(1), 265.1(c)(5) (1982). It may be safely assumed that the delivery of small amounts of hazardous materials or the accumulation of such materials within landfills will frequently result in the transmission of such materials to groundwaters. Requiring delivery of small amounts of hazardous wastes to approved hazardous waste disposal facilities would, of course, remove some of the competitive advantage which small generators otherwise enjoy. The Florida Water Quality Assurance Act (1983) requires the establishment of local government hazardous waste collection facilities for generators of less than 1000 kg/mo, and provides stiff penalities for generators who fail to use them. [14 Current Developments] Env't Rep. (BNA) 413 (1983). Legislation now pending in Congress would require regulation of small generators. S. 757, H.R. 2867, 98th Cong., 1st Sess. (1983).

[324] 40 C.F.R. § 261.6(a) (1982) exempts from the Subtitle C requirements altogether some materials being legitimately recycled or reclaimed, or stored or treated for that purpose.

By far the largest volume of hazardous wastes not burned as fuel, some 3.5 billion gallons in 1981,[327] is disposed of in underground injection wells, for which neither RCRA nor UIC standards have been developed.[328] Disposal on the land surface accounted for some two billion gallons in 1981.[329] Recent publication of interim final rules for land disposal[330] has resulted in a furious controversy about their adequacy.[331] It has also sparked serious proposals to prohibit the on-land disposal of hazardous wastes altogether.[332]

Others, such as sludge or listed wastes, must conform only to some of the requirements. *Id.* § 261.6(b). Recently proposed regulations for recycling would impose notification and storage permit requirements for recyclers, but would exempt from regulation only wastes being legitimately recycled. 48 Fed. Reg. 14,472 (1983).

[325] 40 C.F.R. §§ 264-265 (1982).

[326] It is estimated that as much as one-third of the 57 million tons of hazardous waste generated each year may thus escape regulation, at least in part, when it is treated as "recycled" under 40 C.F.R. § 261.6 (1982). New enforcement guidelines, however, are designed to prevent "sham recycling" by insisting that wastes being blended or burned have a certain minimum heat value, and that the wastes be actually consumed. 48 Fed. Reg. 11,157 (1983).

[327] Survey for the EPA Office of Solid Waste, reported in 5 GERAGHTY & MILLER, INC. NEWSLETTER 1 (1983) [hereinafter cited as Survey].

[328] Class IV wells injecting hazardous wastes into or above an underground source of drinking water (USDW) must comply with RCRA notice and annual reporting requirements. 40 C.F.R. § 122.45 (1982). Those injecting directly *into* a USDW in May 1980 may continue to do so at the same rate until 6 months after a state UIC program is approved, but no new wells may be established. *Id.* § 122.36. Existing hazardous waste wells injecting *above* a USDW may continue to operate until final regulations are published. 47 Fed. Reg. 4994 (1982). No criteria or standards for Class IV wells, however, have been developed under either UIC or RCRA.

S. 757, 98th Cong., 1st Sess. (1983), would amend RCRA to prohibit underground injection of hazardous wastes within 1/2 mile of the USDW. H.R. 3200, 98th Cong., 1st Sess. (1983), proposes a similar amendment to SDWA.

[329] Survey, *supra* note 327. About 272 million gallons, only five percent of the total, was disposed of in proper incinerators. *Id.* Rules for incinerators are found at 40 C.F.R. §§ 264.340-.347, and 265.340-.347 (1982). Incineration is potentially one of the safest and most efficient disposal methods for most types of hazardous wastes. Because of relatively high costs, however, there are only about 15 high temperature controlled incinerators operating in the country. S. EPSTEIN, L. BROWN, & C. POPE, *supra* note 310.

[330] 47 Fed. Reg. 32,274 (1982).

[331] A flurry of lawsuits has been filed by 20 public interest and trade groups. [13 Current Developments] ENV'T REP. (BNA) 927 (1982). The EPA has indicated a willingness to negotiate changes on some issues, but not on others. [13 Current Developments] ENV'T REP. (BNA) 2210 (1983).

[332] The National Governors Association recently approved a resolution that the EPA "should be required to develop regulations phasing out the burial of hazardous wastes where alternative treatment techniques are reasonably available . . . . The land disposal of wastes that are highly toxic or persistent should be immediately prohibited." Boffey, Experts Show-

The new rules are intended to apply to approximately 2,000 facilities which require permits.[333] The EPA says that the rules are designed to reduce planning uncertainty by avoiding regulatory schemes that rely on complicated predictions about the long term fate, transport, and effect of hazardous constituents in the environment.[334] While regulated industries may appreciate straightforward technical rules, without any requirement of scientific modeling or prediction, in order to facilitate their planning, they may still obtain variances from the rules by demonstrating that their wastes will never migrate to ground or surface water supplies.[335] Of course, such a demonstration must employ scientific prediction and may involve considerable uncertainty about environmental effects. In addition, the EPA has announced that it is considering a new "degree-of-hazard" approach to permitting land disposal facilities, based on environmental settings and an evaluation of costs and risks at each site.[336] Under this approach, the EPA would issue permits on more of an ad hoc basis rather than relying on consistent and more objective standards. In either case, the permitting process could become enormously more complicated and expensive for state regulators than was initially expected, and the public could be exposed to greater risk because of reliance on an uncertain scientific and technological data base.

The regulations contain design and operating standards for four kinds of land disposal facilities.[337] New hazardous waste landfills,

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ing Concern on Safety of Burying Toxic Waste in Landfills, N.Y. Times, March 16, 1983, at A20, col. 1. The State of California has now banned land disposal of five categories of hazardous wastes: cyanides, toxic metals, strong acids, PCBs, and halogenated organic compounds. [13 Current Developments] Env't Rep. (BNA) 1383 (1982). The EPA is considering a similar limited restriction. 47 Fed. Reg. 48,726 (1982). Several bills now pending in Congress would forbid any land disposal of certain hazardous wastes: H.R. 2867, 98th Cong., 1st Sess. (1983); H.R. 1700, 98th Cong., 1st Sess. (1983); S. 757, 98th Cong., 1st Sess. (1983); S. 1363, 98th Cong., 1st Sess. (1983).

[333] [13 Current Developments] Env't Rep. (BNA) 363 (1982).

[334] 47 Fed. Reg. 32,283 (1982).

[335] 47 Fed. Reg. 32,357, 32,359, 32,365 (1982) (to be codified at 40 C.F.R. §§ 264.221(b), .251(b), .301(b)). An operator may allow the pollution of groundwaters to levels set out in the Interim Primary Drinking Water Standards for the 14 hazardous constituents, or even to higher levels if the operator shows that such higher levels will not endanger human health or the environment. 47 Fed. Reg. 32,351 (1982) (to be codified at 40 C.F.R. § 264.94).

[336] 47 Fed. Reg. 55,880 (1982). *See also* 46 Fed. Reg. 11,126 (1981) for an earlier, similar proposal.

[337] 47 Fed. Reg. 32,274 (1982), amending 40 C.F.R. §§ 122, 260, 264-265. The new regulations are discussed in Bromm, *EPA's New Land Disposal Standards*, 12 Envtl. L. Rep. (Envtl. L. Inst.) 15,027 (1982), and in an extended preamble in the Federal Register entry. "Land treatment facility," "landfill," "pile," and "surface impoundment" are defined at 40 C.F.R. § 260.10 (1982).

waste piles, and surface impoundments must install an impermeable liner to prevent leakage into groundwaters.[338] New landfills and piles are required to have leachate collection and removal systems, as well, to intercept any losses of fluids.[339] Existing facilities need not retrofit liners or leachate collection systems, even though they may continue to receive hazardous wastes,[340] and the EPA will allow some expansion of such a facility without compliance.[341]

Surface impoundments must remove all hazardous materials upon closure, or place a cover on top and maintain it for thirty years thereafter.[342] Other facilities, too, which leave hazardous wastes in place will remain responsible for containment of such materials for only thirty years,[343] although the wastes themselves may remain dangerous for generations.

Almost all facilities must install monitoring wells and test the groundwater regularly for leachates which might escape from the facility.[344] Groundwater may be degraded to the level of the fourteen hazardous substances in the National Interim Primary Drinking Water Standards, but not below background levels for other contaminants, unless the operator can show no threat to human health or the environment, in which case further degradation could be allowed.[345] If these standards are violated, the operator must take corrective action immediately.[346] Landfills, piles and surface impoundments may avoid the monitoring requirement by installing a double liner and a leak detection system.[347]

There is considerable skepticism about the standards, however. A number of experts have flatly stated that all liners eventually leak, that leachate collection systems do not work, and that the monitoring rules are inadequate.[348] Moreover, critics have charged that current regulations "contribute to the incomplete internalization of the full, long-term costs of land disposal."[349] According to the Chief of the EPA's Hazardous Waste Implementation Branch, 'U.S. industry has the knowledge and technology to deal with the problem, but as long as cheap landfills are available and the government subsidizes it," alternative technologies will not be used.[350]

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[338] 47 Fed. Reg. 32,357, 32,359, 32,365 (1982) (to be codified at 40 C.F.R. §§ 264.221(a), .251(a)(1), .301(a)(1))

[339] 47 Fed. Reg. 32,359, 32,365 (1982) (to be codified at 40 C.F.R. §§ 264.251(a)(2), .301(a)(2)).

[340] 47 Fed. Reg. 32,315 (1982).

[341] The new regulations exempt all *new* landfill units and cells constructed at interim status facilities from liner and leachate collection system requirements until a permit is issued, in effect postponing imposition of the standards. [13 Current Developments] ENV'T REP. (BNA) 532, 1391 (1982). S. 757, 98th Cong., 1st Sess. (1983), would amend RCRA to require double liners and leachate collection systems for all lateral expansions of existing landfills, as well as groundwater monitoring for all land disposal facilities.

[342] 47 Fed. Reg. 32,358 (1982) (to be codified at 40 C.F.R. § 264.228).

[343] 40 C.F.R. § 264.117 (1982); 47 Fed. Reg. 32,356 (1982) (to be codified at 40 C.F.R. § 264.117(a)(1)(i), (ii)).

[344] 47 Fed. Reg. 32,352-55 (1982) (to be codified at 40 C.F.R. §§ 264.97-.99).

[345] 47 Fed. Reg. 32,351 (1982) (to be codified at 40 C.F.R. § 264.94).

[346] 47 Fed. Reg. 32,355-56 (1982) (to be codified at 40 C.F.R. § 264.100).

[347] 47 Fed. Reg. 32,357, 32,360, 32,365 (1982) (to be codified at 40 C.F.R. §§ 264.222, .252, .253, .302).

Aside from the Clean Water Act, RCRA is the only federal tool for systematic, prospective control of the enormous threat to groundwater. EPA's new land disposal rules indicate that the Agency will not use its full statutory authority under RCRA to protect vital groundwater supplies. The new rules do provide some economic incentives for recycling hazardous materials which otherwise would be discarded,[351] but the Agency could do much more to encourage source controls and in-stream recycling so that fewer wastes are generated. It could also require complete destruction or neutralization of wastes not recycled, instead of placing future generations of Americans at risk.[352]

D. Other Federal Statutory Authority

Several other statutes may provide the basis for a comprehensive federal groundwater protection policy. None has yet been used to its full potential for this purpose.[353]

The National Environmental Policy Act (NEPA)[354] requires consideration of the effect on groundwater quality and quantity for all major federal activities.[355] The Act itself contains no enforceable standards, although as a matter of *policy* each government agency could be required to protect and preserve some uniform groundwater quality standards, or to apply a nondegradation standard.

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[348] Testimony before a House Science and Technology Subcommittee is reported in [13 Current Developments] ENV'T REP. (BNA) 1277 (1982).

[349] Joel Hirshhorn of the Office of Technology Assessment, reported in [13 Current Developments] ENV'T REP. (BNA) 2211 (1983).

[350] [13 Current Developments] ENV'T REP. (BNA) 1277 (1982).

[351] 48 Fed. Reg. 14,472 (1983). The proposed rules would exempt from regulation hazardous materials actually reused by their generator or reclaimed by someone else, burned as or used in fuel, or recycled in certain other ways.

[352] *See* S. 1363, 98th Cong., 1st Sess. (1983), described *infra* note 390.

[353] Many of the statutes, along with their possible applications, are described in WORKSHOPS, APPENDICES VI and VIII.

[354] 42 U.S.C. §§ 4321-4370 (1976 & Supp. V 1981).

[355] NEPA § 102(2)(C), 42 U.S.C. § 4332(2)(C) (1976).

Section 309 of the Clean Air Act[356] requires the EPA to review and comment on the environmental effect of any federal government activities which invoke its authority, including proposed legislation or regulations, construction projects, or major agency actions. The Agency could use this "watchdog" authority to coordinate agency efforts to protect groundwater.[357]

While groundwater is not expressly mentioned in the Toxic Substances Control Act (TOSCA),[358] that Act gives the EPA broad powers to regulate the distribution in commerce, use, or disposal of any chemical substance that could present "an unreasonable risk of injury to health or the environment."[359] The Agency is specifically empowered both to prohibit and to prescribe particular methods of use or disposal, or even to prohibit the manufacture of such a threatening material.[360] The Act also contains a provision for abatement of imminent hazards posed by such materials.[361] This statutory authority could be employed by the EPA to further regulate the use and disposal of toxic substances in order to ensure the integrity of groundwater sources.

The Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)[362] is thought by the EPA to be the only comprehensive authority for the *cleanup* of spills and hazardous waste sites.[363] Superfund expands on the model furnished by Clean Water Act Section 311,[364] applying a revised National Contingency Plan whenever there is a release or "substantial threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare."[365] The Act also mandates the listing and cleanup of at least 400 highest priority facilities in the country,[366] using funds ap-

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356. 42 U.S.C. § 7609 (Supp. V 1981).

357. *See* WORKSHOPS, APPENDICES, *supra* note 6, at VI-2.

358. 15 U.S.C. §§ 2601-2609 (1982).

359. TOSCA § 6(a), 15 U.S.C. § 2605(e) (1982).

360. *Id.* §§ 6(a)(1), (2), (5) and (6), 15 U.S.C. §§ 2605(e)(1), (2), (5) and (6) (1982).

361. *Id.* § 7, 15 U.S.C. § 2606 (1982).

362. 42 U.S.C. §§ 9601-9657 (Supp. V 1981); 26 U.S.C. § 4611-4682 (Supp. V 1981).

363. "The Superfund program . . . is a remedial action cleanup program; it does not set standards nor does it regulate any activity." REAGAN POLICY, *supra* note 19, at I. Only the imminent endangerment statutes, *supra* notes 183-186, have been used in such a broad range of cases as Superfund seems to cover. Superfund has its own imminent endangerment provision in § 106. The Agency has concluded that RCRA may not be applied to inactive sites. 43 Fed. Reg. 58,945, 58,984 (1978).

364. *See supra* text at notes 229-32.

365. Superfund § 104(a)(1), 42 U.S.C. § 9604(A)(1) (Supp. V 1981).

366. *Id.* § 105(8), 42 U.S.C. § 9605(8)(B) (Supp. V 1981).

propriated for the purpose or collected through taxes on petroleum and chemical products.[367]

It was mainly due to controversy surrounding the implementation and enforcement of Superfund that the leadership of the EPA was replaced early in 1983.[368] The new Administrator has announced that he will bring a new emphasis to the program, acting promptly to investigate and clean up threatening waste dumps, then worrying later about who should pay for the work.[369] In any event, Superfund was intended to be primarily remedial in operation,[370] and it has been so regarded by the EPA, so that it provides little opportunity for advance planning or avoidance of hazards. It has been suggested, moreover, that the draft Reagan Policy conflicts with the National Contingency Plan,[371] which "precludes a consideration of future use of groundwater," and that the Policy perhaps should not cover Superfund.[372]

A number of other statutes provide the EPA with regulatory authority which could be invoked in order to protect groundwater supplies. Section 275(b) of the Uranium Mill Tailings Radiation Control Act[373] requires the EPA to set standards for activities at active mill sites, and Section 275(a) covers cleanup of inactive sites. The Surface Mining Control and Reclamation Act[374] expressly calls for protection of groundwater quality in the issuance of mining permits,[375] and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA),[376] by requiring registration of all pesticides and other economic poisons, allows the EPA to impose restrictions on their use[377] or even to suspend their use in emergencies.[378] These statutes, as well as numerous other acts, administered by a variety of agencies, deal with particular sources of contamination or aquifer protection, and so too could be part of an integrated federal strategy to safeguard groundwater supplies from *future* acts of destruction.[379]

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[367] *Id.* §§ 201-232, 26 U.S.C. § 4611-4682 (Supp. V 1981).

[368] A strategy of stressing voluntary compliance and administrative, rather than judicial enforcement, is revealed in a confidential memorandum from Assistant Administrator Lavelle, reported in [13 Current Developments] ENV'T REP. (BNA) 1483 (1982). An EPA internal report has confirmed charges of serious mismanagement of toxic waste programs. Shabecoff, Internal E.P.A. Review Criticizes Mismanagement in Toxic Cleanup, N.Y. Times May 11, 1983, at A1, col. 2.

[369] Among many statements to that effect see Pasztor, EPA Moves to Accelerate Cleanup Work at Nation's Worst Chemical Waste Sites, Wall St. J., May 16, 1983.

[370] In the preamble, it is declared to be "An Act to provide for liability compensation, cleanup, and emergency response for hazardous substances released into the environment and the cleanup of inactive hazardous waste disposal sites." Pub. L. No. 96-510, 94 Stat. 2767 (1980).

[371] 47 Fed. Reg. 31,180 (1982).

[372] Memorandum of EPA Assistant Administrator for Water, reported in [13 Current Developments] ENV'T REP. (BNA) 880 (1982).

[373] 42 U.S.C. §§ 7901-7942 (Supp. V 1981).

[374] 30 U.S.C. §§ 1201-1328 (Supp. V 1981).

[375] 30 U.S.C. §§ 1257(b)(11), 1265(b)(10) (Supp. V 1981).

[376] 7 U.S.C. § 136 (1982).

[377] 7 U.S.C. § 136a(d) (1982).

Although there is no comprehensive congressional plan for protection of the nation's groundwaters, many of the elements of such a plan may be found in the various statutes discussed above. Taken together, these statutes give the EPA and other federal agencies wide-ranging authority to achieve the goals of the Reagan Policy. The immediate problem in the EPA's policy proposal is not the sufficiency of its authority, although a more coherent congressional mandate certainly would be desirable. Rather, the problem is in the Agency's reluctance to assert that authority. The making and implementation of regulations has been marked by reticence and by compromise. Two Agency staff members recently expressed the opinion, for example, that 93 of the 115 worst hazardous waste sites first targeted for Superfund cleanup could not have been prevented under the current rules enforced by the EPA.[380]

We certainly cannot minimize the difficulty and complexity of the Agency's work, nor the political controversy surrounding its performance. Many devoted professional staff members have labored to enforce the nation's pollution control laws fully and aggressively. But until the EPA makes an institutional commitment, however, to coordinate the application of the various laws, and to push to the limits of its authority to protect the public's health and the environment, the need for new *authority* seems not to be an issue. On the other hand, new legislation may be helpful in clarifying the EPA's *responsibility* to act in areas where it has been reluctant to do so up to now.[381]

V. ELEMENTS OF AN EFFECTIVE GROUNDWATER PROTECTION STRATEGY

The EPA, of course, is not entirely responsible for the lack of a coherent national groundwater program. Congress' instructions to the EPA have not always been perfectly clear, and the EPA's regulatory efforts have enjoyed a mixed reception in the courts. Under-funded, overworked, and beset by conflicting political forces, the Agency has certainly made notable progress given the conditions under which it must function. The Agency must assume responsibility, however, for failing to address this critical problem earlier, for giving in too often to parochial interests, and for generally neglecting to take the long view in protecting this vital resource for future generations.

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[378] 7 U.S.C. § 136d(c) (1982).

[379] *See* WORKSHOPS, APPENDICES, *supra* note 6, at VII.

[380] 4 GERAGHTY & MILLER, INC. NEWSLETTER 2 (1982).

[381] Examples may be found in pending amendments to the Clean Water Act, *supra* note 218; Safe Drinking Water Act, *supra* notes 258, 271; and RCRA, *supra* note 323.

Outlined below are proposals for elements of a new national groundwater protection policy. They depend for the most part on existing statutory authority, and are designed to eliminate the fundamental problems inherent in the EPA's treatment of this problem to date, as described above. No effort has been made to provide either a comprehensive plan or details for the immediate implementation of any one element. Rather, the proposals are intended to provoke critical thinking about new approaches to the problem.

A. *A Groundwater Impact Statement (GWIS) should be prepared for every activity which might have a significant effect on groundwater quality.*[382] The GWIS ought to be part of a wider, systematic analysis of environmental impacts which might be regulated under federal law. Preparation of such a statement for a proposed consumptive withdrawal of groundwater, for example, would require consideration of possible increases in concentration or redirection of pollutants already present in the aquifer; or, the GWIS for a new highway would have to consider runoff and infiltration from road salting. The burden of preparing the statement would be borne by the person, business, or agency whose activity might threaten the aquifer. With full opportunity for public participation, the GWIS procedure should increase the likelihood that all economic and other costs associated with each activity will be taken into account.

B. *National Pollutant Discharge Elimination System permits should be required for groundwater pollution.* Their administration would fit easily within the existing regulatory framework for surface waters.[383] Since the two sources are almost invariably interconnected, it makes sense to deal with the common problem of "water" pollution under a single program. No new regulatory machinery would be required. Uniform source limitations or best management practices could be applied, perhaps with some tailoring to meet local needs and conditions. Uniform results would be assured by use of the same water quality strategy applied to surface waters, that is, national criteria based on locally designated uses (together with a nondegradation rule).[384] As with the surface water program, source limitations not stringent enough to achieve or preserve desired groundwater quality in a particular area would be scaled back under Sections 302, 301(b)(1)(c) or 303(d).[385] NPDES permitting could fill the gaps in other federal programs, such as in the operation of sanitary landfills under Subtitle D of RCRA.

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[382] If the EPA is currently obliged under the Clean Water Act, for example, to regulate changes in or threats to groundwater quality, as suggested above, *supra* text and notes at notes 178-242, it certainly is empowered to require such statements from activities which might reasonably be expected to invoke its regulatory apparatus. *See supra* text and notes at notes 151-152.

[383] *See supra* text and notes at notes 180-84, 241.

C. *Nondegradation must be an integral part of the groundwater policy.* Because of the inherent difficulty in predicting future effects of groundwater contamination, or future needs for clean groundwater,[386] its application in a groundwater program is even more compelling than in the area of air or surface waters protection.

D. *The states have a vital role to play in the implementation of the policy, just as they do under NPDES.* An effective partnership of national and local governments will permit the application of uniform standards which are tailored to account for local needs and conditions. Technical assistance and financial support must obviously be provided by the EPA. Strong financial assistance must be given for state program development as well as for research to improve the quality of the information base on which planning and implementation must rely.

E. *Aquifer recharge areas should be identified as quickly as possible, and activities within those areas should be strictly controlled to minimize threats to the aquifers.*[387]

F. *Small volume disposers of hazardous materials should be regulated by rule, and stiff penalties should be assessed for violations.* Proper disposal facilities must be made available, perhaps by state governments, to businesses and individuals who have no other economical way of disposing of such materials.[388]

G. *On-land disposal of hazardous wastes should be prohibited.*[389] Criticism resulting from publication of the new land disposal rules under Subtitle C of RCRA indicates that the risks are unacceptable, especially since there apparently are alternative ways of disposing of hazardous materials. Moreover, the sacrifice of land areas for such an exclusive use ignores the possible land use needs of future generations.

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[384] *See supra* text and notes at notes 180-81, 184, 215-20.

[385] *See supra* note 184.

[386] *See supra* text and notes at notes 164-67, 218, 260-61.

[387] A thoughtful discussion may be found in Tripp & Jaffe, *supra* note 272, at 31-46.

[388] A recent enactment of the Florida legislature is one imaginative solution. *See supra* note 323.

[389] *See supra* note 332.

H. *We must redouble our efforts to reuse or recycle wastes, to neutralize them so they are harmless, or to simply avoid their production in the first place.* A variety of tactics have been suggested.[390] Materials deposits, effluent charges, waste exchanges and process controls are only a few. Until we shift our focus from waste *disposal* to waste *avoidance* we will continue to need the expensive, complex regulatory apparatus described here.

I. *A public information campaign of unprecedented proportions should make groundwater contamination a serious moral concern.* The "Keep America Beautiful" program sponsored by the packaging and beverage industries provides a useful model. When the public is better informed about the problem, it will more readily accept needed controls and the associated costs. The public may also be directly involved in the abatement process through citizen suits under existing federal laws.

J. *One federal agency must provide leadership in directing the implementation of a uniform policy to guide all the machinery of government at all levels.* The EPA is the logical choice for this role. Obviously, the Agency's attitude towards its own role in ensuring groundwater quality must change.

VI. CONCLUSION

The EPA's proposal to develop some kind of coherent national groundwater pollution control strategy should be applauded. Its continuing encouragement and technical support have been enormously valuable to many states struggling to develop their own strong regulatory programs. The draft Reagan Policy, however, and indeed the policy followed by the Agency since its inception, seem unlikely to result in any uniformity in groundwater protection among the states. Of course, the proposal would not fill in the regulatory gaps left by the EPA's narrow interpretation of its duties under the various federal statutes. What is needed instead is the strongest possible institutional commitment by the EPA to take all measures within its authority to protect the nation's people and their environment.

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[390] S. 1363, 98th Cong., 1st Sess. (1983), would require the EPA to specify best available management practices for each hazardous waste, using a heirarchy of methods as follows:

a) Reducing the volume of the waste;
b) Outside recycling or reuse;
c) Treatment to render it non-hazardous;
d) Treatment to reduce the hazard;
e) Disposal.

Details of a solution will not be worked out overnight. We still have a great deal to learn about the very nature of the problem and all its implications. Difficult questions must be answered about the proper roles of federal and state governments. Even if we could reach a consensus about how to proceed, sheer inertia will make it difficult to change our old bad habits. Yet, we cannot be dissuaded by the complexity or persistence of the problem from seeking a wise solution. The problem simply will not go away, because there is no "away".

The Editors, in an attempt to provide an open forum for ideas and opinions on environmental issues, encourage and welcome the submission of both original manuscripts and responses to articles published in the *Boston College Environmental Affairs Law Review*. Please direct correspondence to Solicitations Editor, *Environmental Affairs Law Review*, Boston College Law School, 885 Centre Street, Newton Centre, Massachusetts 02159. The *Environmental Affairs Law Review* regrets that it cannot assume responsibility for manuscripts submitted.

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INSTITUTE FOR LIBERTY AND COMMUNITY,
Concord, VT, July 11, 1985.

Mr. CURTIS MOORE,
Senate Environment and Public Works Committee,
Washington, DC.

DEAR MR. MOORE: I understand your committee is about to hold a public hearing on acid rain in Vermont.

It would probably serve no purpose for me to testify, but I would appreciate it if the enclosed article on the Clean Air Act from the Barre Times Argus could be included in the published hearing volume.

Yours truly,

JOHN MCCLAUGHRY.

[From the Barre (VT) Times Argus, Apr. 10, 1985]

THE CLEAN AIR ACT AND ACID RAIN

(By John McClaughry)

Last November, Vermonters applauded the news that the Environmental Protection Agency (EPA) had imposed new restrictions on tall smokestacks on Midwestern idustries and power plants. This, it is said, will cut down on the emissions that produce acid rain here in New England. And with the convening of a new Congress, hopes have been raised that in 1985, at last, there will be a breakthrough, and the Clean Air Act, which technically expired in 1982, will be reauthorized and significantly strengthened.

There is a prominent school of thought, subscribed to by Republican and Democratic politicians alike, in which the Clean Air Act assumes a status akin to that of the Holy Grail. If only the Reagan Administration would agree to strengthen and enforce the Act properly, we are told, the skies would clear, our forests and lakes would thrive again, and Vermont would be restored to its original state of nature unsullied by the foul emissions of those hideous Midwestern industries and utilities. This is a particularly attractive line for anyone in Vermont politics, because (a) almost everybody wants to believe it, (b) it is good for environmentalist votes and campaign contributions, and (c) the only interests damaged by it are hundreds of miles west and don't vote here. For New England politicians, complaining about acid rain is a political freebie of great value, ranking well ahead of outrage at Eskimo seal killing and the use of poison gas in Cambodia.

The laws governing air pollution control are among the most complex and mystifying ever adopted, amended, and demogogued, comparing favorably with dairy legislation and the Internal Revenue Code. If one delves into the actual workings of the Act, however, the case becomes stronger and stronger that the Clean Air Act has probably done more to cause our acid rain problem than to put a stop to it. Astonished? Read on, carefully.

The 1970 Clean Air Act required new power plants to reduce air pollution levels to New Source Performance Standards. Concentrations of the designated pollutants were to be measured by an EPA employee standing at the plant gate. Plant designers thus considered various ways to get within the standards at the plant gate. Most commonly, they did so by doubling the height of the smokestack. Since the 1970 act was passed, more than 400 extra tall smokestacks have been built—170 of them over 500 feet high. The only purpose of the extra tall stacks is to dump that crud into the upper air so it will blow away to some Godforsaken place like Vermont. The 1977 amendments to the Clean Air Act pretty much closed off the "tall stacks" loophole. The November EPA announcement made its use even more difficult, and applied the requirement retroactively to plants which were perfectly legal when designed and built. But seven years of damage had been done. Most of those tall stacks would never have been built had it not been for the Clean Air Act.

Furthermore, the New Source Performance Standards required a great deal of additional expense to utilities and industrial plants—but the standards did not apply to pre-1970 plants. Normally utilities and industries rebuild or replace their old plants in due course. One would expect that the new plants would be much cleaner than the old ones. But the utilities, realizing how expensive, time-consuming, and uncertain it would be to replace the old plants, simply decided to stick with the dirty plants for some years more. So, thanks to the Clean Air Act, we got fewer new plants and more old plants on line. Thanks again, Clean Air Act.

There are several ways of cleaning up sulfur emissions from coal burning plants. The most obvious is to burn coal with low sulfur content. Low-sulfur coal comes mainly from the West, where it is strip mined, usually by nonunion heavy equipment operators. High-sulfur coal comes from underground mines in the East, worked by United Mine Workers. To comply with the 1970 Act, utilities could have simply switched coal suppliers. Aha! Not so fast.

This thought was anathema to two drastically different lobby groups, the environmentalists and the Eastern dirty-coal producers and their unions. The environmental groups favored requiring polluters to install expensive and complicated stack scrubbers because that appeared to offer tangible evidence that emissions were being removed. The Eastern dirty-coal producers wanted required stack scrubbers because it would eliminate any incentive for Midwestern plants to meet Clean Air standards by bringing in Western low-sulfur coal.

Thanks to the lobbying of this "unholy alliance," section 111 of the 1977 Clean Air amendments established the requirement that a coal burner had to install a stack scrubber regardless of the sulfur content of the coal burned. Now if an Indiana or Ohio power plant has to scrub its flue gases anyway, why pay the rail freight for Wyoming low-sulfur coal? Furthermore, the use of Western coal assured a lawsuit by the Eastern coal companies and the UMW under the notorious section 125, which prohibits fuel-switching that might throw some Eastern miners out of work. In a celebrated case, a Cleveland utility appealed this prohibition to President Carter, who told them they had to stick with high-sulfur coal.

Now comes the next hooker. Unfortunately, the scrubbers cost a lot to run, they don't work very well, and they break down a lot. Also, except in the newest plants, EPA monitoring is spotty, and often done at predictable times by a visual device which in any case doesn't work at night. So power plant operators neglected to repair malfunctioning scrubbers until caught, or simply turned them off at night or between expected inspections. One survey revealed that the scrubbers in Ohio stacks operated only 40 percent of the time, at best. When the scrubbers are broken down or turned off, all those high sulfur emissions come boiling out of the stacks and head for Vermont. Thanks a lot, Clean Air Act.

The economically sound solution for air pollution is to tax it out of existence. For every unit of various pollutants emitted above some threshold standard, the power plant owner would have to pay. However, the plant manager would have the free choice of how to avoid paying: burning low sulfur coal, coal washing, stack scrubbing, fluidized bed combustion, or whatever other technique might look promising—except that tall stacks built for no reason other than spreading the pollution into the eastbound airstream would be penalized.

Unfortunately, the environmental movement and their favorite politicians have until recently vigorously opposed any kind of "effluent tax," as proenvironment Senator William Proxmire found out to his sorrow when he introduced such a bill in the Senate in 1969. Their reason is more theological than economic: they view pollution as a major example of Mankind's Sinful Desecration of the Planet. They want Sin stamped out by Righteousness instead of allowing it to survive through payment of an indulgence in the form of an effluent tax.

The environmentalists have been more interested in concocting complex and bewildering regulatory schemes, perhaps because those schemes impose enormous costs on the Big corporations, create more regulatory jobs for environmental movement activists, and provide almost limitless opportunities for prolonged "public interest" litigation.

They have only rarely shown interest in creating a non-bureaucratic, economically sound legal framework which produces clean air because it's cheaper for polluters to clean up than to go on polluting. The environmental groups' support for EPA's December proposal to impose a pollution tax on heavy trucks and engines may at last be the political breakthrough needed to make far wider use of this sensible and cost-effective approach.

The "stationary source" provisions of the Clean Air Act, on close examination, appear to have done far more to damage Vermont's air than to clean it up. It has been a major and direct cause of the imported portion of the acid precipitation our politicians love to announce.

There is no political mileage, and much risk, in offering a critical analysis of the practical effects of the Clean Air Act. If one of them dared to offer anything of intellectual value on the subject in place of the usual anti-Midwest demogoguery—a event about as unlikely as a tidal wave washing away Maple Corners or Congress producing a balanced budget—it would subject him to the immediate scorn and derision of the environmentalists and their congenial editorial writers.

Those politicians seeking the environmentalist vote—and that's every politician in Vermont—can thus be expected to keep on snorting and puffing about acid rain and the evil polluters out in the Midwest. Unless the New England public wakes up to how the Clean Air Act has been a major cause of our acid rain problem, we will probably be struck with that problem for a long time.

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